December 1974

Think

Chinese art exhibit

A special folio in color

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Letter from the Chairman

Season's Greetings

One of the joys of this holiday season is that it is a time for us to put aside for a while our everyday cares and preoccupations to count our blessings. These are trying times and none of us should gloss over the difficulties the world faces, but in IBM we have much to be grateful for.

I believe we can all draw strength from this season to face the challenges of the coming year. IBMers will do that in many different ways, for we are of many different faiths and viewpoints, cultures and backgrounds. But we are united in our work together and encouraged and sustained by our sense of fellowship and common understanding.

As we move through the holiday season, I want to wish each of you and your families peace, hope and all the joys of good fellowship.

Frank Cary

The consumer's right to better products at lower prices or the protection of individual competitors from competition—that, says IBM counsel, is the 'classic confrontation' in the Justice Department suit, now scheduled to go to trial on February 18.

A special report on the Justice Department suit

On Friday, November 1, lawyers for the Justice Department filed a motion in Federal court asking that the Government be allowed to amend and add to the antitrust charges originally filed against IBM almost six years ago.

This was tantamount, said IBM counsel in court, to having the plaintiff turn around and say, "Well, contrary to what I have said in the past, I would like to try some other issues." The switch came after six years of arduous pretrial preparation by IBM, including what is probably the most elaborate discovery procedure undertaken in any Federal court.

On November 21, attorneys representing IBM and the Justice Department met at the Federal Courthouse in New York City to argue that motion before Judge David N. Edelstein, chief judge of the United States District Court for the Southern District of New York.

Chief spokesman for the Justice Department was Raymond M. Carlson. Addressing the court on behalf of IBM was Thomas D. Barr, a partner in the New York City law firm of Cravath, Swaine & Moore.

Arguing that if the motion were allowed it would substantially delay the start of the trial, Barr held that delay would not only do IBM harm, but that it would harm the public. The new issues presented by the Justice Department reflect matters already under review in other Federal courts as the result of private antitrust suits brought against IBM by what Barr described as "ne'er-do-well competitors" who are unhappy with IBM's "better products and lower prices."

(Continued on back leaf)

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Think

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ISSUES

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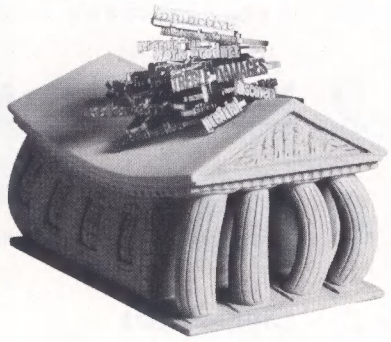
Only a few decades ago, it was practically unheard of for one company to sue another because of alleged antitrust violations. Not anymore. Today the private antitrust suit is being used increasingly by firms that range from the very small to the mammoth.

Some of the litigation is unquestionably valid. But more and more, say critics, this kind of court action is becoming a refuge for companies that just can't cut it in the marketplace.

A major incentive: treble damages. The winner in a private antitrust suit automatically gets reimbursed to the tune of three times the amount of damages that are found to have been caused by the violation or violations.

What this often means is that a company with a flimsy case will sue in the faint hope of ending up with a treble damages windfall. "After all," says one professor of law, "what do they have to lose except their lawyers' fees?"



How to go to college without going broke 25

The cost of college has been rising faster than the cost of living, placing a heavy burden on many families. Yet, as many freshmen will enter college next fall as ever before, according to the U.S. Office of Education. *Think* examines some ways that students and their families can manage the largest investment that many families make. Decisions range from choosing the college itself to deciding how you will attend, to exploring a growing variety of aid from public and private sources. The hopeful news is that the present crisis is spawning more ways of attending college—and paying for it—than were thought possible a few years ago.

THE WORLD

Quarter-century 8

1974 marks the 25th anniversary of the formation of the IBM World Trade Corporation and, judging by the results, there hasn't been anything quite like it in the history of international business. Its growth—in terms of people and products—has been phenomenal. From $51-million in 1950 to more than $5-billion last year, its gross revenue has helped the IBM Corporation retain its worldwide leadership as a premier international company. *Think* looks back at the highlights of WTC development, and IBM Treasurer Bert Witham gives a perspective on what U.S. IBM employees think about World Trade. In addition, outstanding events in the history of World Trade are traced through a "history highlights" chart through this year, when the world of IBM World Trade was divided into two separate new corporations: IBM Americas/Far East Corp., and IBM Europe/Middle East/Africa Corp.

FINANCE

Debt 30

It's debt that makes the world go 'round, and especially in the U.S., where public and private debt has soared to $2.5-trillion. More than $1-trillion is corporate debt, and in this present-day period of inflation and recession, bankers are beginning to look warily at the upward climb in corporate debt-equity ratios. A recent study in *Business Week* discloses that three-fifths of the 500 largest U.S. nonfinancial corporations now owe 50 cents or more for each dollar of equity. Not yet alarming, perhaps, but *Newsweek* observes that this corporate debt-equity ratio has more than doubled since 1955. How is IBM faring? The company's debt-equity ratio stands at about 6 percent. Like a number of other corporations, IBM has been able to finance its expansion largely out of retained earnings. During the last ten years alone, the company has invested $5-billion of its earnings in the business.

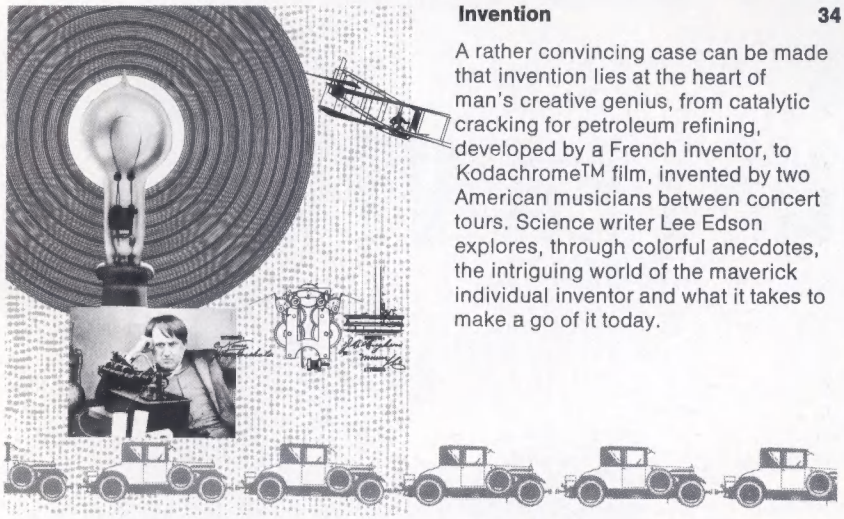
HUMANITIES

Il Duomo 18

The dome of the Florence cathedral, which towers 390 feet above the Italian city, is a 500-year-old architectural marvel that has puzzled designers ever

Cover: An impressive monster mask knocker from a palace door is among 385 archaeological finds from The People's Republic of China that went on view this month at the National Gallery of Art in the nation's capital. The exhibit, which has attracted large and enthusiastic crowds in Europe—it was viewed by three-quarters of a million people in London alone—has been brought to the U.S. with the help of an IBM grant to the National Gallery.

TECHNOLOGY



Invention **34**

A rather convincing case can be made that invention lies at the heart of man's creative genius, from catalytic cracking for petroleum refining, developed by a French inventor, to Kodachrome™ film, invented by two American musicians between concert tours. Science writer Lee Edson explores, through colorful anecdotes, the intriguing world of the maverick individual inventor and what it takes to make a go of it today.

since the time of Michelangelo. The question is: How did architect Filippo Brunelleschi build this masterpiece of the early Renaissance, using tons of masonry, without any external scaffolding? No one knows the answer quite yet, but with the help of computers, researchers from IBM's scientific center in Pisa and the University of Florence are making impressive gains in unraveling the mystery. Meantime, their experiments have had an important side effect: The new techniques they've developed could be used to preserve other treasures of antiquity.

THE COMPANY

What's new in engineering? **44**

Much of the creative work of engineers in industry, due to its proprietary nature, must remain virtually anonymous. This was true within the System Products Division, IBM's largest, until last month.

In November, more than 500 leading SPD engineers attended an IBM-confidential closed meeting in Puerto Rico. There, they participated in forums and seminars where 60 of their number reported on advanced work being done in leading-edge technology.

They also honored 15 of their own. And SPD President Ted Papes announced the first two recipients of the division's new Pathfinder Award, given for sustained technical excellence.

Notes

For the second time, IBM has received the Golden Key Award from Opportunities Industrialization Center (OIC) for contributions to the center's programs to help the disadvantaged.

The presentation was made by OIC's founder, the Rev. Leon H. Sullivan, at the organization's annual dinner in New York City. It was accepted "on behalf of all the men and women of IBM" by Frank T. Cary.

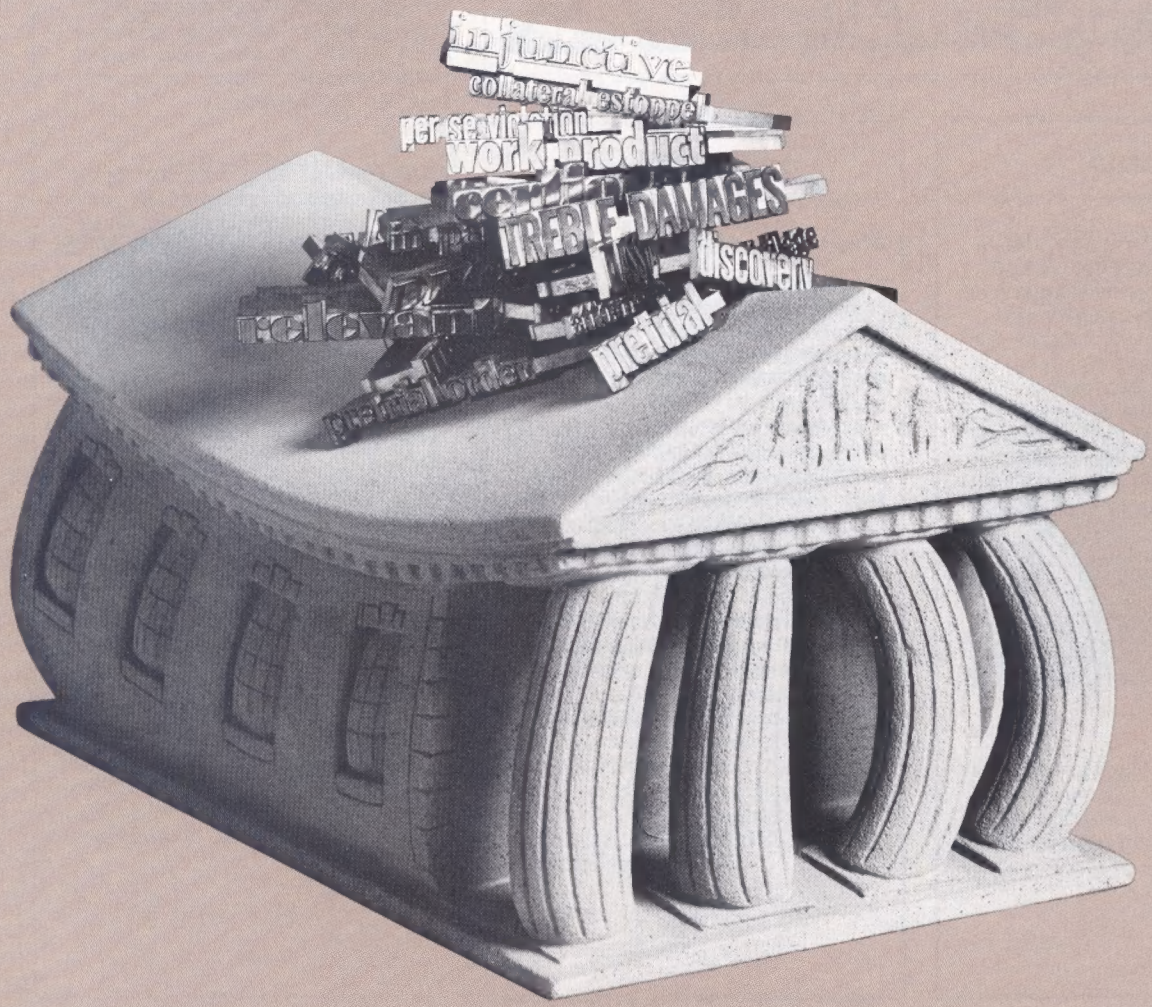
OIC, now in its tenth year, operates 115 centers in the United States and in several African countries to train disadvantaged men and women in new skills and to place them in meaningful jobs. Many corporations support OIC financially. IBM has for seven years, and now provides additional support, in equipment and people, in 60 cities. Much of IBM's effort has been focused on the Computer Training Center in New York City's Harlem.

An IBM World Trade Corporation grant has made it possible for the New York Philharmonic to schedule a four-week concert tour of Europe next summer—its first visit to the Continent in seven years. The trip, which begins next August, will take the 106-member ensemble to the United Kingdom, Belgium, Switzerland, Germany, and France.

In presenting the grant, Jacques G. Maisonrouge, president of the IBM World Trade Corporation, noted that the tour comes during the early stages of America's Bicentennial celebration. "I see the Philharmonic's tour," he said, "as an opportunity for our European audiences to share the richness of America's cultural heritage."

During its 16-concert tour, the orchestra—under Conductor Pierre Boulez—will play at five leading music festivals, including the opening concerts of the Edinburgh and Berlin Festivals; the closing concerts of the Lucerne Festival; the Flanders Festival in Ghent and Brussels; and the Festival d'Automne in Paris.

ARE TREBLE DAMAGE SUITS OVERLOADING THE COURTS AND CREATING CONFUSION IN ANTITRUST LAW?



In recent years, the private antitrust suit—the kind where one company files charges against another—has become almost commonplace. While there were only 228 such suits in the Government's fiscal year of 1960, the figure for fiscal 1972 and 1973 combined was more than 2,400. One reason for the increase—the potential pot of gold at the end of the legal rainbow. Damages awarded are automatically trebled for a victorious plaintiff in such a suit.

Does this kind of motivation inspire litigation and court decisions that are, in the final analysis, good for the consumer? That is a hotly debated question. In the following article, *Think* presents some background on the treble damage suit, as well as the arguments for and against it.

by Peter Hillyer

It was nearly 85 years ago that a crusty Republican Senator, John Sherman, proposed and fought through the 51st Congress of the United States a historic piece of legislation.

Passed in 1890, the Sherman Act was the nation's first Federal antitrust law, and is still considered the most important and comprehensive.

The Sherman Act was written and passed in response to a great public clamor. Large and complex organizations, often portrayed in political cartoons of the day as greedy octopi with tentacles creeping across the land, were seizing control of entire industries.

They could raise prices at will, exclude competitors, and, in the final analysis, operate without any regard for the consumer.

The Sherman Act was designed to counter this public-be-damned attitude. It made not only restraints of trade illegal, but also monopolies. It was broadly written to cover as many situations as possible that might arise in the future.

Its principle objective was to protect the consumer.

It was based on the premise that, in a free-enterprise system, healthy competition would naturally result in better products at lower prices.

The Supreme Court of the United States affirmed this economic idea in 1956 when it said in a decision "... the unrestrained interaction of competitive forces will yield the best allocation of our economic resources, the lowest prices, the highest quality, and the greatest material progress . . ."

The Sherman Act was followed by other antitrust legislation, much of it aimed at defining and prohibiting specific anticompetitive acts—for example, certain kinds of mergers, tie-in sales, and price discrimination.

The nation's body of antitrust law has been further amended and added to (and generally made tougher) by wide-ranging and precedent-setting judicial interpretation of the legislation, particularly the Sherman Act.

Today, certainly, the most blatant antitrust violations seem to have been curbed. But now, some people think, antitrust laws and other legislation similarly enacted to protect the consumer are being twisted. How? By being used to protect competitors from the rigors of competition, rather than to protect the man on the street, the customer, the end-user.

An example of this turn-about, say critics, can be found in some of the Government-regulated industries, where companies sometimes appear to be protected from the rough and tumble of the competitive marketplace.

The Wall Street Journal, in a critical series on Federal regulatory agencies, cited a number of situations where Government regulations led to inefficiency and higher costs for the consumer.

Also under attack from many sources, but particularly from business, is the venerable Sherman Act itself—not because it clamps restraint on unduly aggressive entrepreneurs, but because of its unsettling vagueness.

It is not uncommon for what had long been considered a conventional business practice to be declared in vio-

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Peter Hillyer is an information advisor in the information programs department at Armonk.

Viewpoint

As others see those treble damage suits

Something relatively new on the legal scene, private antitrust suits, are bringing a flood of litigation to already overburdened courts. A major incentive: If the plaintiff wins, he automatically gets three times the amount of actual damages determined. This, to put it mildly, can amount to an awful lot of money. Here, some views on the phenomenon from assorted sources:

"You can shoot your neighbor . . . you can embezzle his property and you can be involved in all kinds of moral turpitude, and you can be sued. But you'll be liable only for the damages you've done, not three times that amount. The automatic trebling of damages is something, I suggest, that is almost unique to antitrust laws."—*Miles W. Kirkpatrick, member of the Philadelphia Bar, in a symposium on antitrust law*

"Private suits are much less likely . . . to reflect a thorough assessment and dispassionate conclusion regarding the public interest."—*Donald F. Turner, Professor of Law, Harvard Law School*

"What we find happening is private litigation going about the business of attempting to restructure major U.S. industries—for better or for worse."
—*Ira M. Millstein, member of the New York Bar*

"Until Congress revises the antitrust laws, the Supreme Court will continue to change business practices in suits brought by private parties . . . With the complexity of modern business, industry and commerce, it is no longer desirable to have major antitrust questions determined in suits brought by private parties. The initiation of such suits should be the sole responsibility of the Government. Private suits for damages, whether single or treble, should be limited to those specific offenses which are made subject to criminal penalties."—*Joseph W. Burns, member of the New York and District of Columbia Bars*

" 'This is the golden age of the antitrust bounty hunter,' says Washington antitrust attorney John C. Scott. 'Today the private plaintiff packs a harder wallop than either the Justice Department or the Federal Trade Commission.' "—*The Wall Street Journal*

lation of the Sherman Act—after the fact. This means, say critics, that a corporation can do everything in its power to stay within the law yet still be found guilty of a transgression—depending upon a particular court's interpretation of the law. And these interpretations, the record shows, vary greatly, from court to court, judge to judge.

Then there is the matter of treble damages—an issue that is getting hotter and hotter, and costlier and costlier.

A private company suing for damages as a result of an antitrust violation by a competitor is entitled to collect three times the amount of the actual damages determined. This can be a considerable sum.

The Sherman Act did not specify treble damages, but the Clayton Act, passed 24 years later, did. The Clayton Act spelled out a number of specific violations which were not explicitly covered in earlier legislation.

For many years almost all antitrust suits were brought by the Government —by either the Justice Department or the Federal Trade Commission. Seldom did one company sue another. There seemed to be a feeling that it was not proper etiquette (a feeling that, obviously, has passed). In addition, various court rulings have made it easier for private antitrust litigation to be pursued. An example: The expansion of the scope of discovery—the pretrial procedure in which the plaintiff seeks vital information about the defendant's practices.

A turning point in this attitude was the criminal conviction in the early 1960s of a number of electrical equipment companies for conspiring to fix prices. A series of criminal actions was brought by the Government. But hundreds of private civil suits piggybacked on the subsequent conviction, asking treble damages. The resultant payout was huge. And, from that time on, more attorneys and companies began to consider the private suit as an alternative to taking their complaints to a Government agency.

"The order of the day," said Phillip Areeda, a Harvard law professor and now a White House counsel, commenting on the current trend toward treble damage suits, "seems to be . . .'Sue. You have nothing to lose but your lawyers' fees, and much to gain through windfalls or settlements.' "

According to Areeda, who has written several books on antitrust law, "the greater the uncertainty of antitrust law, the greater is the opportunity for venturesome plaintiffs to initiate a private suit for either or both of two reasons: to enter the treble damage lottery, in which even a thief of trade secrets can win hundreds of millions of dollars of recovery; and/or to induce a dominant or leading firm to be less aggressive, or, perhaps, even less competitive in the marketplace."

An economist who spends much of his time on such cases said that an investment in a good treble damage suit was probably more productive than the same amount of money spent on conventional research and development.

On the other hand, many supporters of private antitrust suits say they have proliferated because they are needed, and they point to what they claim is a record of Government inaction, the fact that the Justice Department files less than 10 percent of the antitrust cases filed each year.

Maxwell Blecher, a Los Angeles antitrust attorney, charged that the Government "has failed to act and the private sector has filled the vacuum. Management is now results-oriented rather than concerned about being accepted at the club." He expects the number of private suits to continue to increase.

Professor George J. Stigler of the University of Chicago, a member of a Presidential Task Force on Antitrust, strongly supported the private use of the antitrust laws in which anyone injured by a violation of those laws can sue as a "private attorney general."

"Anybody should be able to enforce the antitrust laws," said Stigler. "There is no way for bureaucrats to know what is happening. The only way the Government finds out is through letters of complaint."

Another antitrust attorney, commenting on Justice Department and Federal Trade Commission actions, said that flagrant abuses by big companies were often ignored while the Government "is out swatting flies. It is bringing criminal cases charging a group of Mom-and-Pop grocery stores in Waco, Texas, with fixing the price on the deposit of pop bottles . . ."

The Supreme Court itself has referred to private action as a "bulwark" of antitrust enforcement which "furthers the overriding public policy in favor of competition."

But does it?

That's the rub, say many businessmen, lawyers, economists, and public officials. The strike-it-rich allure of treble damages attracts not only the legitimate plaintiff, but cases that are, at best, flimsy—brought to court, apparently, in a sort of why-not-give-it-a try? gesture.

It's charged that treble damage suits, while undeniably a weapon in the nation's antitrust enforcement arsenal (nobody wants the octopus back), also have led to corporate ambulance chasing—litigation at the drop of a writ on the off chance that a magnificent settlement may be the reward. The legitimacy of the grievance is secondary to the potential reward for the litigant.

Scott Bohon, a corporation counsel, referred to a dubious treble damage suit as the kind "brought by unsuccessful businessmen who have already gone out of business . . . who are simply trying the antitrust alchemy to create gold out of grave dust."

Are private antitrust suits likely to be in the public interest? Not necessarily. The plaintiff, after all, is motivated by the possibility of some sort of self gain. And the motivation may or may not be mixed with concern for a particular industry and, ultimately, the consumer.

What's more, say some knowledgeable observers, the ideal of a truly competitive marketplace may actually suffer because of the threat of such suits. Dr. Kenneth G. Elzinga, an economist at the University of Virginia, said: "It is difficult to distinguish between predatory behavior directed at one rival and aggressive competition, which, in the process, may hurt the rival but benefit the industry."

The result: Companies—in order to avoid undue risk—may forego price cuts and even technological innovation which, at some later date, might be considered by the courts as being illegally anticompetitive. The loser, of course, would be the consumer.

It appears that the courts, in dealing with private antitrust suits, are often receptive to the arguments of the plaintiffs, and that they are, as Areeda says, tolerant of "rather modest" proofs of damages. The general counsel of a large company, in advocating the out-of-court settlement of private suits whenever feasible, said that the courts, once having found an antitrust violation, often "are cavalier when it comes to antitrust damages."

Another argument made against many private suits is that, in addition to money damages, the plaintiffs often ask for some form of relief—for example, the prohibition of certain marketing practices or even the splitting up of a dominant company. Such relief may not, indeed, be good for the industry or its consumers—just for the company bringing suit.

The basic problem, of course, is to distinguish between the legitimate suit in which a "private attorney general" is truly advancing the public interest, and the less substantial one which seems to be aimed—not at promoting a healthy, competitive marketplace—but at collecting a windfall settlement.

There is little doubt that what must be avoided is a situation which *Vision* Magazine referred to last year . . . "that less efficient corporations are starting to wield the antitrust club to win in the courtroom what they are unable to win in the marketplace." ■

Quarter-century

1949 was a very good year. It marked the establishment of IBM's World Trade Corporation.

IBM AND WORLD TRADE GROWTH IN REVENUES
(In millions)

'The past quarter-century in World Trade has helped make IBM the great company it is today. Still, I believe the best days of IBM—worldwide—are still out in front of us.'

—IBM Chairman Frank T. Cary

There is nothing quite like it in the history of international business.

—From a tiny Toronto storefront, it has spread to towering office complexes in 128 countries around the globe.

—Its gross revenue has jumped a hundredfold in 25 years—from $51-million in 1950 to more than $5-billion last year.

—Its population has skyrocketed from 9,500 in 1950 to 122,000 in 1973.

—It provides nearly 50 percent of IBM's gross income.

—It provides more than 50 percent of the company's profits.

This year marks the 25th anniversary of the IBM World Trade Corporation,* which has achieved all those records and which recently formed two operating companies to better handle its spectacular growth—IBM World Trade Europe/Middle East/Africa Corporation, and IBM World Trade Americas/Far East Corporation.

Gilbert E. Jones, for eight years deputy to Arthur K. Watson, chief architect and first president of the World Trade Corporation, sums up the reasons behind IBM's dramatic success overseas: "It's people, growth, and profit. World Trade's exciting story is mirrored in each of those elements."

Jones, now IBM vice chairman, has been board chairman of WTC since 1970 when Watson vacated that post to become U.S. Ambassador to France. He attributes the success of World Trade in its early years to two things—the vision of Thomas J. Watson, Sr., who more than a half century ago foresaw the opportunities that lay in business overseas and to the leadership given World Trade by Dick (A. K.) Watson, especially in the latter's choice of people. Jack Brent, for example, became Watson's assistant as general manager for Europe, and together they anticipated the opportunity for IBM to develop after the war when the economy, through the Marshall Plan, began to expand. Under their direction, IBM developed its people abroad and was able to participate in the expansion.

During the early Fifties, the U.S. product line moved from the punched card to the computer. A similar shift occurred in World Trade during 1959, 1960, and 1961. IBM went from punched cards to the 1401 computer, and this led to the first concept of IBM Europe. With System/360, World Trade began to catch up with the United States in sophistication. With System/370, World Trade became an equal partner.

What have been the most notable achievements of World Trade?

- **Laboratories.** From 1963 to 1968, World Trade labs became an integral part of IBM's worldwide product line. They had their own missions and, as a result, the worldwide product line grew bigger and better.
- **Regional concept of manufacturing.** Associates say that Dick Watson was a man well ahead of his time. He always had a dream, they recall, that IBM would manufacture *in* Europe *for* Europe. Gradually, during the 25-year span, IBM arrived at a point where roughly 85 percent of the product line is manufactured abroad to be used abroad. Today, new technologies are

* On July 8, 1949, the IBM World Trade Corporation was formed. It started business effective January 1, 1950. The company first went into business overseas in 1908 when one of its predecessor companies signed a contract with the British Tabulating Machine Co. The first foreign subsidiary was established in Canada in 1917, three years after Thomas J. Watson, Sr., had joined the Computing-Tabulating-Recording Company. In 1923, IBM opened offices in six South American countries. By 1949, IBM had operations in some 100 countries around the world.

World Trade today

On April 4 of this year, the world of IBM World Trade—viewed in historical perspective in this article—became two worlds: the IBM World Trade Americas/Far East Corporation under Ralph A. Pfeiffer, Jr., and the IBM World Trade Europe/Middle East/Africa Corporation under Jacques G. Maisonrouge.

"No single management," said IBM Chairman Frank T. Cary at the time of the reorganization, "can review in detail such a great and growing business."

Today, IBM's two overseas enterprises shape up as follows:

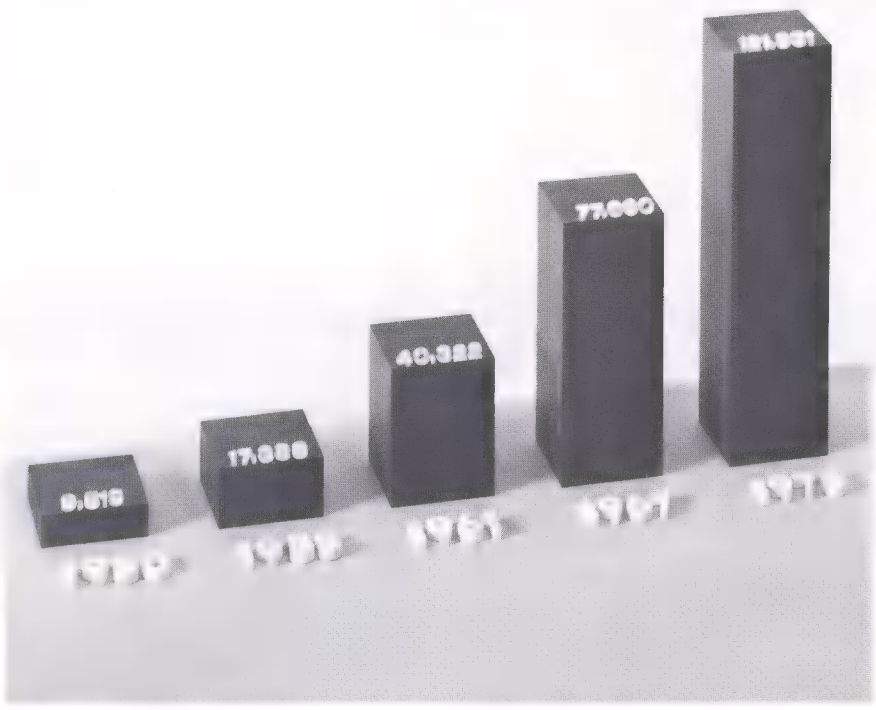
Americas/Far East

With a territory of nearly 22 million square miles A/FE encompasses 45 countries, 6 other locales, and some 37,000 IBM people in Canada, Central and South America, Australia, New Zealand, and the countries of the Far East. IBM Japan, Canada, and Brazil head the list of country companies of this new corporation, which has 150 sales offices, 7 data processing equipment plants, 4 office products plants, 97 data services centers, 34 DP education centers, 2 resident education centers, 2 development engineering laboratories, and 2 scientific centers.

Europe/Middle East/Africa

Its 90,000 people live and work in 83 countries, from Reykjavík, Iceland, to Cape Town, South Africa; from Ireland to Pakistan. They operate 14 manufacturing plants, 307 sales offices, 24 card plants, 6 development labs, 8 scientific centers, 115 data centers, and 54 education centers. The European countries provide the bulk of this corporation's sales revenue, and the company has actively sought business in Eastern Europe, including the Soviet Union, from offices in Vienna and Paris.

GROWTH IN WORLD TRADE EMPLOYEE POPULATION



being developed worldwide.

▪ **Management development.** This was an undertaking to which Dick Watson attached particular importance, according to his World Trade colleagues. The results can be seen in the development of a management overseas which Frank Cary rates among the best in the world. A chief contributor to the development of that management is Jacques G. Maisonrouge, the onetime head of IBM France who became president of WTC in 1967 and is now chief executive officer of IBM Europe/ Middle East/ Africa.

▪ **Sophisticated hardware and software.** Some examples: the banking in-industry in Great Britain and Japan; the NHK system in Japan; and the international airlines systems used by B.O.A.C., Alitalia, and developed jointly with the U.S. company. This was, in fact, the first example of joint cooperation between the U.S. and World Trade.

▪ **National relations.** Tom Watson, Sr., insisted that one of the key ways of doing business abroad was to be an

(Continued on page 15)

The country general manager sets the tone

Gil Jones calls him "an expert on how to run a global financial operation." He's Bertram H. Witham, elected treasurer of IBM last February and still very much involved in World Trade.

Witham, who has served as controller, treasurer, and vice president of WTC, was elected to its board of directors in 1972. "World Trade is a very important part of our total team," he says. "IBM looks good because our people abroad help make us look good."

A former U. S. Air Force colonel who holds a degree in business administration from the University of California at Berkeley and a graduate degree from the University of Pittsburgh, Witham joined WTC in 1961.

Bert Witham

Does he feel that U. S. IBMers understand the importance of World Trade?

"The level of understanding is much better than it was six or seven years ago. There's been a concentrated effort by the Corporate Office during the past few years to bridge our two worlds. We're having joint board meetings abroad. The Corporate Management Committee pack up their bags to meet with country managers on their home ground. They recognize the country manager as important. That sets the tone for the rest of IBM.

"Some people still look at a country operation and say, 'Why, that's not even as big as the Dallas branch office.' What most managers in the U. S. must realize, of course, is that the country manager is not running a branch office, but a completely integrated company in which he is the chief executive officer. He alone is accountable for everything that happens within a certain geographical area."

To what does Witham attribute World Trade's success in the past 25 years? "There are many reasons—all people—like Eddie Goldfuss who did so much to structure the organization and establish principles which allowed for growth. The people abroad who made it work, such as Lorne Lodge in Canada, Fritz Hausser in Germany, Bernard Denoix in France, Hans Luethy in Switzerland, to name only a few. On this side, many who are now corporate officers worked in WTC, such as Paul Rizzo who was controller and Art Northrop, assistant controller. Bob Dunlop as director of World Trade manufacturing and Walt Burdick and Walt Pedicord, directors of personnel. The worldwide cooperation of many people has made WTC successful.

"There's a genuine common basis of understanding between IBMers all over the world," Witham continues, "whether they're working face-to-face or by computer hookups, within laboratories or plants, in marketing or finance. It's incredible that this could happen in such a short period of time."

One of Witham's top aides, Klaus J. Hendricks, director of intercompany programs, who has been with IBM for 40 years, sums it up this way: "World Trade has made contributions in so many ways, in so many different ideologies. Our people, our products, and our company have become part of every major nation's life." ■

'The past 25 years have been a period of growth and fantastic challenges. All World Traders have proven they could do their jobs with dedication and talent. But, more importantly, they have proven that men and women of different nationalities and backgrounds could work well together for not only the benefit of their company, but also for their nations as well.'

—[illegible]

1949
IBM World Trade Corporation formed on July 8 with Thomas J. Watson, Sr., as chairman and H. K. Chauncey as president . . . Termination of contract with British Tabulating Machine Co., enables IBM to do business worldwide—U. K. is the first country outside of the U.S. in which equipment manufactured by one of IBM's predecessor companies was marketed, starting in 1908.

1950
IBM World Trade Corporation goes into business January 1.

1951
Start of IBM United Kingdom.

1952
Arthur K. Watson elected vice president and general manager of IBM World Trade Corporation.

1954
Arthur K. Watson elected WTC president.

1955
IBM Argentina produces its first machines for export.

1956
Thomas J. Watson, Sr., founder of IBM, dies at 82 . . . Thomas J. Watson, Jr., becomes chief executive of IBM . . .

1958
West Germany installs first IBM 705 in Europe.

1959
First IBM 704 installed in Japan by Government Meteorological Agency.

1960
WTC expands its plants in Scotland, France, and Japan and starts construction on new laboratory buildings in France, Holland, and Germany . . . IBM Germany opens new research and development laboratory in Boeblingen . . . IBM RAMAC 305, first large-scale system in Brazil's automobile industry, used by Volkswagen.

1963
A. K. Watson becomes WTC board chairman . . . Gilbert E. Jones elected president of WTC.

1964
New IBM System/360, first fully compatible system, announced in Europe.

1965
Microelectronics made in IBM plant at Essonnes, France, used in every IBM System/360 made in Europe, the first instance of major integrated circuit production in Europe . . . Panama Canal Company completes 50 years as IBM customer in Latin America.

1966
IBM dedicates new plant in Vimercate, Italy, and new laboratory in Lidingo (near Stockholm), Sweden.

1967
Jones becomes a senior vice president and a member of the Corporate Management Committee. Maisonrouge elected WTC president and IBM vice president.

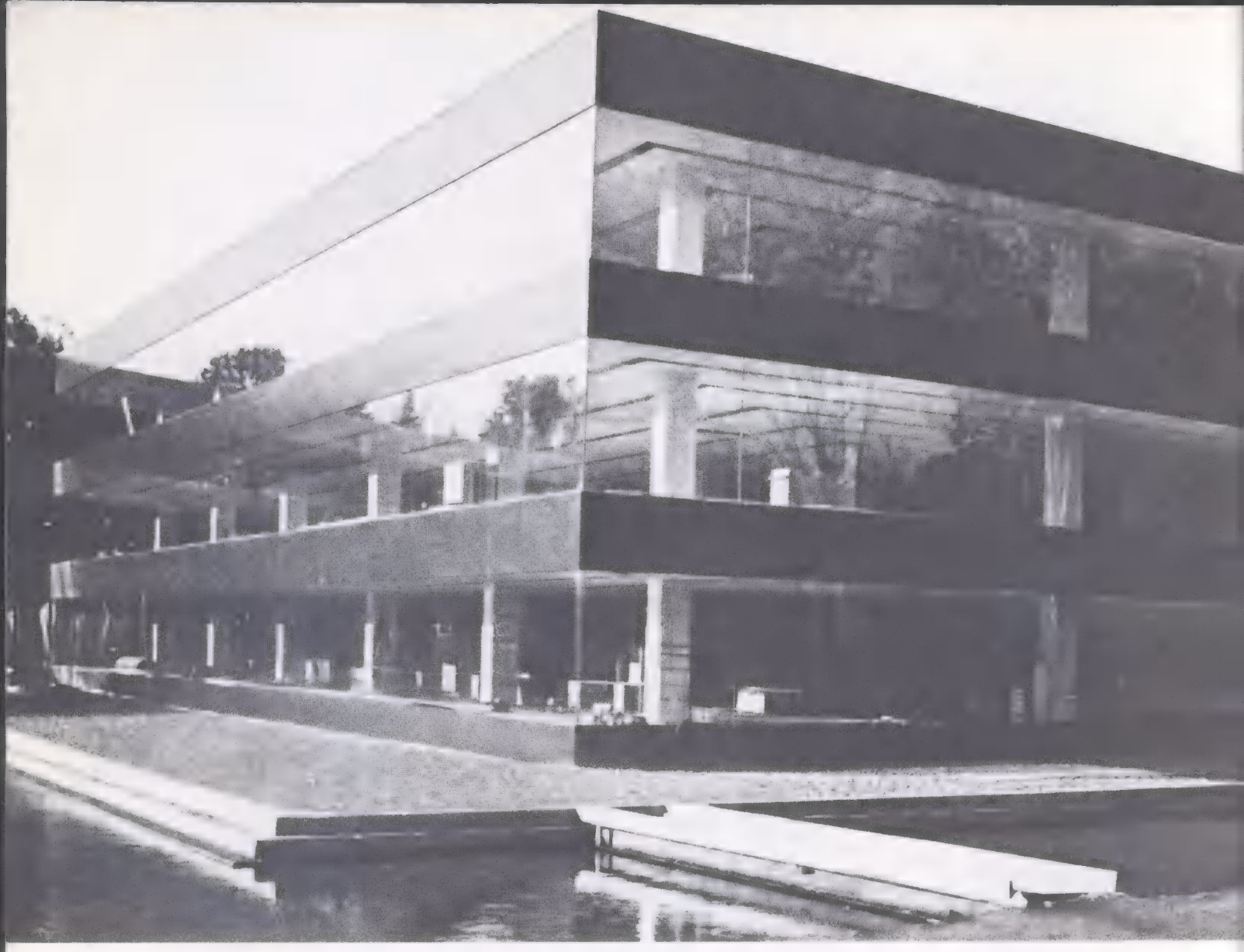
1968
Dedication of a 304,000-square-foot Office Products plant at Amsterdam.

1969
IBM System/3 is announced, and in Germany, the Boeblingen laboratory, in cooperation with plants and laboratories in the U. S., develops the printer, while in the U. K., the Hursley laboratory develops the disk storage files; System/3 units and components are manufactured by WTC plants.

1970
For the first time, World Trade contributes more than half of IBM's net earnings.
A. K. Watson named U. S. Ambassador to France. He is succeeded as chairman of WTC by Gilbert Jones.

1973
Jones named a member of IBM's Corporate Office in January; Maisonrouge becomes WTC chief executive officer.

1974
Establishment of two operating subsidiaries for the conduct of World Trade business—Americas/Far East Corporation, headed by Ralph A. Pfeiffer, Jr., and Europe/Middle East/Africa Corporation, headed by Jacques G. Maisonrouge.



New home for the Amer

by Claire Stegmann

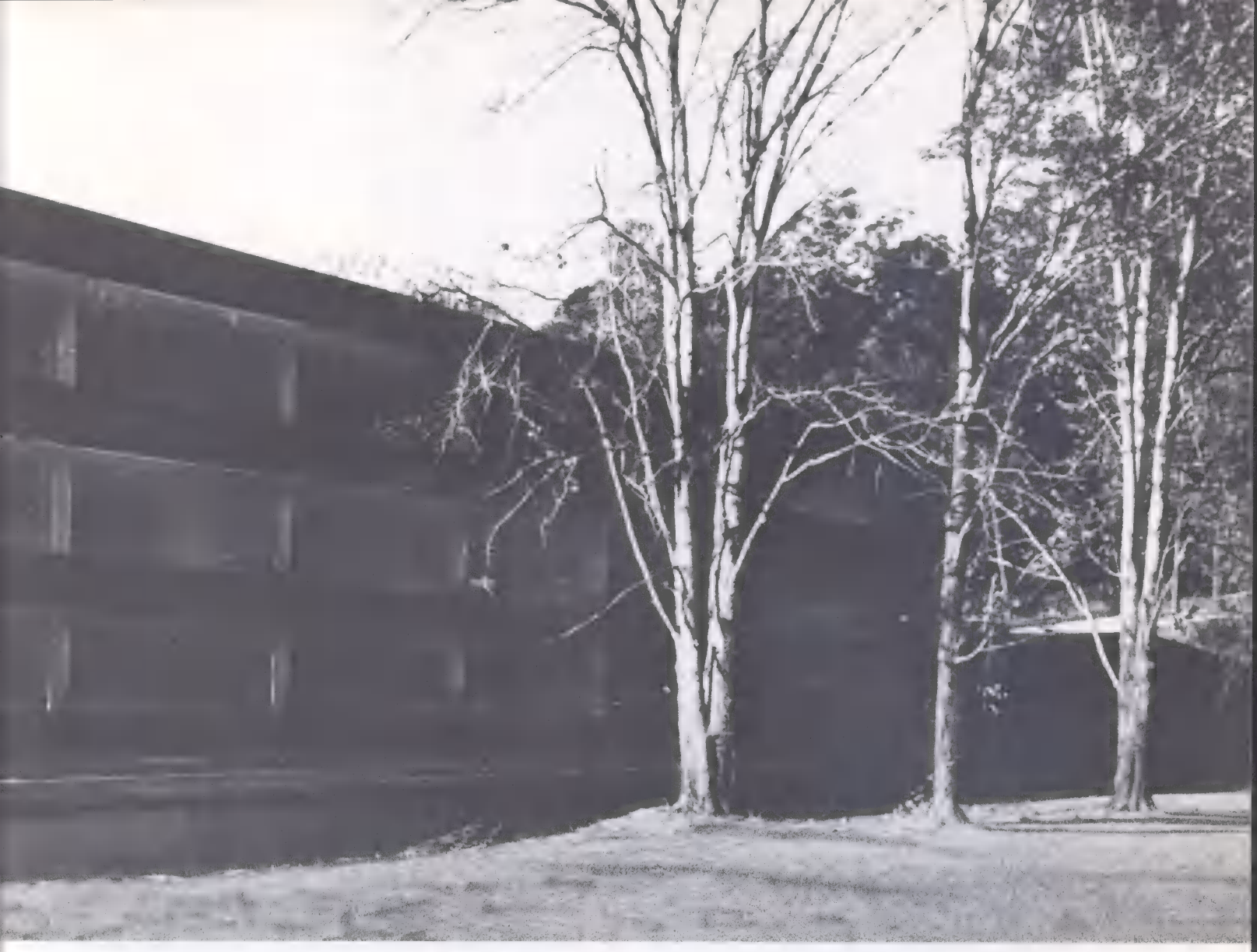
Sometime before A/FE's first birthday in April, IBM's new World Trade Americas/Far East Corporation Headquarters staff expects to be housed together, for the first time, under one handsome new roof. Early in the new year, 1,000 IBMers, including representatives from 22 of the 45 A/FE countries, will begin the move—from eight office locations in New York City, White Plains, and Port Chester—to the three-story building which architect Edward Larrabee Barnes has shaped into a giant *W*, sheathed in forest-green aluminum, and built into the rolling hillside of the 85-acre IBM property, in Mount Pleasant, three miles north of Tarrytown, N.Y.

A/FE has taken great care to preserve the stunning natural beauty of the Hudson River Valley (the river lies just over the hills to the west, beyond a state park). "It has been a very careful and studious effort," says Bill Teuteberg, director of A/FE Headquarters operations, "to nestle a building that is modern in every way into an untouched meadowland and make it look as though it belongs there."

Architect Barnes is fond of adapting buildings to environments. His recent projects include a Maine college dedicated to ecology, which expects to draw its power and heat from wind and sun, and Kansas City's well-publicized Crown Center, a "city within a city." Barnes is master planner of the center, which includes a hotel lobby architects have built against a 60-foot-high waterfall.

At Mount Pleasant, again, water follows its natural course. A creek becomes a moat on three sides of the building, which reflects the glass above and provides added insurance against fire. The meadow pond will remain as it is, a home for bass and mallard ducks, who like to settle there. Trees, too, have been carefully protected. Fine stands of sycamore, silver maple, oak, hickory, and tulip poplars, surrounded by skillful riprap constructed by Italian stonemasons, form pockets of shade for parked cars. A berm of tall hemlock across from the gatehouse makes the building invisible from the road and adds to the already magnificent view from within, as seen through what appears to be one continuous floor-to-ceiling windowpane.

A/FE is adopting in its new head-



cas/Far East Corporation

quarters a concept, known as open office landscaping, which is already in use or being planned for IBM Italy, IBM Switzerland, IBM U.K., IBM Netherlands, and IBM Finland. Across the building's three floors—each the size of three and a half football fields—5-foot-high acoustical panels and islands of plants define offices of varying size, while denying none a window view.

There are some walls, of course—at reception areas, stairwells, conference rooms, some offices—and they glow with glass-encased "collections"—stamps (82,000 of them), seeds, flags, dolls, seashells—gathered by designer Ivan Chermayeff from the peoples and oceans of the world, each carefully grouped in color patterns that resemble patchwork quilts. ■

When they move to their new business address in Mount Pleasant, near Tarrytown, the A/FE Headquarters staff will be in good company. According to the New York Writers' Project, American Guide series, Washington Irving, America's first internationally known prose writer, was "the first commuter to attract attention to the Tarrytown neighborhood." Famous for his *Sketch Book* tales of Rip Van Winkle and Ichabod Crane, Irving chose the region for a summer residence in 1835, because it combined the seclusion needed for his work, with proximity to Manhattan. His summer neighbors welcomed him with sumptuous receptions, at least one of which featured ice cream molded in the shapes of his celebrated fiction.

Irving's remodeled Dutch farmhouse, Sunnyside, has been carefully preserved. So has the "sequestered glen" he immortalized—Sleepy Hollow—down the road from A/FE Headquarters.

'I saw most of World Trade's first 25 years from the outside and was very impressed. Now, from the vantage point of an insider, I'm even more impressed with the tremendous accomplishments of World Trade people over the years. It has really been a quarter-century of achievement.'

—Ralph A. Pfeiffer, Jr.

Bangkok

Back in 1948, the Royal Thai Government commissioned IBM to undertake an up-to-date census of its population and its agriculture industry, long the mainstay of its economy. Two years later, Siam Cement had become IBM's first commercial customer there. By 1952 IBM Thailand was officially set up in this ancient monarchy of Southeast Asia, which is about twice the size of Colorado.

Recently, the company not only celebrated its 22nd anniversary in Thailand, but also opened a new office building in Bangkok, a contemporary structure *(see picture at right)* that matches the modern quality of life in the Thai capital. The 160 IBM people in the country (there were only six in 1952) have introduced sophisticated products and applications, including a specially developed typewriter to handle both Thai and English and a System/370 Model 135, which is expected to be installed soon at Siam Cement.

At the dedication of the new IBM building, presided over by Phya Manavaraj Sevi, a privy councillor to the King of Thailand, the company presented an endowment for student scholarships to Chulalongkorn University, the oldest university in the country.

The dedication included a religious ceremony performed by eight Buddhist priests and Somdej Phra Yanasangvorn, the abbot of one of the oldest royal temples in Bangkok and one of the king's guardians and teachers in Buddhism.

Representing IBM were Bruce C. Tomson, general manager of IBM Thailand; L. W. Stafford, general manager of the Southeast Asia Region; and C. W. Swift, general manager of the Asia-Pacific Area of the IBM World Trade Americas/Far East Corporation.

Thailand is part of the IBM operation known as SEAR, Southeast Asia Region, which includes 11 countries, ranging in size from a three-person operation in Brunei (a sultanate within Malaysia) to a 300-person enterprise in the Philippines. SEAR constitutes a growing portion of IBM's business in 18 Asian countries. ■

(Continued from page 10)

asset to foreign nations. World Trade management has continued to follow that philosophy.

What about the rise of economic nationalism?

Says Frank Cary: "While nations have continued to think of frontiers as walls—places where things stop—we have viewed them as doors through which products, people, and their ideas ought to be able to pass freely."

Even though governments are trying to develop an industry of their own, according to World Trade management, they still view IBM as an example of a company that is trying to be a good citizen.

The practice of using nationals, was conceived by Tom Watson, Sr., and carried out by Dick Watson. Today, the great majority of country companies are run by nationals. More than ever, World Trade is involved in the decision-making process, and the company —say World Trade executives—looks at its products, its people, its education from an international point of view.

▪ **International understanding.** Has IBM achieved Tom Watson, Sr.'s dream of world peace through world trade? "I really don't think it's so much peace as it is an understanding between people," says Jones. "World Trade has developed such understanding between Americans and French, Americans and South Africans, Americans and Russians. The more interaction we have on the trade level, the more people around the world understand that we're all the same. In IBM, we maximize people's similarities rather than their differences. Dick Watson followed that philosophy. It's a key element to our world peace slogan."

How has the reorganization of World Trade, announced last April, worked out? Very well, according to IBM top management. They say it has allowed Europe to concentrate on Europe as a single entity. They also maintain that the new organization has developed a management team for Latin America and the Far East that can give considerably more attention to that part of the world.

What's ahead? Most World Trade executives agree that 1975 is going to be a difficult year, both in the U.S. and around the world, but long-range, they remain optimistic. ■

United Nations Day

Frank Cary serves as national chairman

"Indifference and ignorance," says United Nations Secretary-General Kurt Waldheim, "have always been the greatest dangers facing the U.N."

For nearly a decade, the United Nations Association of the U.S.A. has worked toward meeting those dangers through education programs, research, and policy studies. The New York-based nonprofit organization has 175 U.S. chapters and 50,000 members.

Last month, the U.N.A. took its educational program to Houston during a full-day meeting called "The U.N. Comes to Texas." Some 1,000 business leaders, students, and prominent citizens attended seminars at the University of Houston on such topics as economic development, the law of the sea, human resources, and the world's food supply.

Among the main speakers at a dinner for 400 were Waldheim; John Scali, permanent U.S. Ambassador to the U.N.; and IBM Chairman Frank T. Cary, who is serving, by Presidential appointment, as national chairman for U.N. Day 1974. U.N. Day commemorates the signing of the U.N. Charter in 1945.

"I think we can all agree," said Cary at the Houston meeting, "that the U.N.'s achievements have not lived up to our expectations. But it is still one of the best methods we have for addressing global problems. There is evidence on every side that people do not have a clear understanding of what the U.N. is and what it has accomplished."

Cary, a member of the U.N.A.'s panel on science and technology, praised the organization's efforts to achieve a greater understanding of the U.N.'s goals. He also applauded U.N.A. policy studies on nuclear non-proliferation, which helped pave the way for an international treaty; on the admission of The People's Republic of China to the U.N., which laid the groundwork for the U.N.'s China policy; and on world environment, which paved the way for a 1972 agreement between the U.S. and the U.S.S.R. on several important environmental issues. ■

As national chairman for U.N. Day 1974, Frank Cary greets Gerald Ford, then U.S. vice president, who gave the main address at a special dinner in New York last June.

Marketplace

A report on products and applications

Up and running

Within a span of four weeks, IBM made first customer installations of two of its most important and exciting new products.

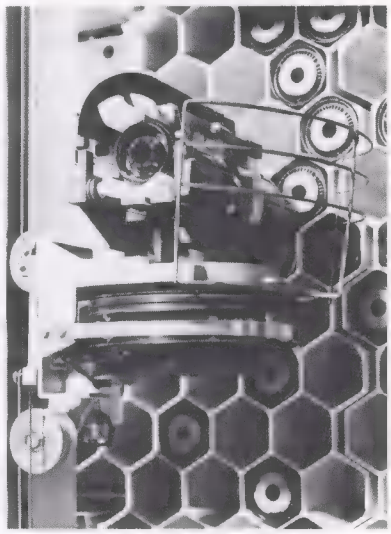
The first retail store system was installed at Dillard's department store in Little Rock, Ark. It included 50 point-of-sale terminals—each with the hand-held electronic wand that reads magnetically encoded price tags on the merchandise. The terminals are located at sales counters throughout the store's three floors.

Retail store systems have since been installed at a second Dillard's in Texas, a J. C. Penney Store in North Carolina, Super Giant in Washington, D.C., and in selected departments of B. Altman's in the New York area. By the end of the year, nine systems will be up and running at customer locations.

First installations of IBM's supermarket system were made almost simultaneously in a Pathmark store in New Jersey and in Steinberg's supermarket in Dorval, Quebec.

The supermarket system features an optical scanner which reads coded information from each item of purchase as it is moved across the checkout counter.

Shipment and installation of the supermarket system is accelerating. Approximately 15 systems will be in operation or in customer test by the end of the year.



System/7 at home

If there is such a thing as the typical American basement, it probably contains a furnace and an endless collection of miscellaneous items, but never a computer. Well, almost never.

In Ohio, IBM System/7 computers have been installed in six private homes and an apartment building to help Ohio State University researchers study how houses and living habits affect the use of energy.

According to Professor Charles F. Sepsy, who is directing the project, the two-year study could lead to a reduction of 20 to 25 percent in residential energy usage and a possible savings in oil alone of over 2 million barrels a day.

The System/7s monitor temperatures in various parts of each test home; record the opening and closing of doors; and periodically check thermostat settings, air and water flow, and the use of appliances and lighting. Through sensors outside each house, the computers also keep track of outdoor temperature, precipitation, wind direction and velocity, and solar radiation. The information is automatically transmitted to a central computer on campus.

'Honeycomb' for storage

A new IBM storage device can hold up to 472 billion characters of information—equivalent to 47,200 reels of magnetic tape at an average utilization of 10 million characters per reel or, putting it another way, equal to two million copies of an issue of *Think*. The data can be fed to a computer as and when it's needed.

According to *Business Week*, the IBM 3850 mass storage system "may be more important . . . than a whole new computer series." It could, for example, hold all the information used by many financial institutions and insurance companies. The system provides the capability to process data randomly or sequentially using magnetic disks. And it does so at a low cost.

Key to the system is a new two-by-four-inch data cartridge that holds 50 million characters of information. The largest Model 3850 contains up to 4,720 cartridges. They are arranged in a honeycomb-like unit equipped with automatic access devices. Two of these units can be included in a mass storage system.

When signaled by the computer, a device locates the required cartridge, moves it to a recording station, and—when the data has been retrieved and placed on disks—returns the cartridge automatically to its storage cell.

Land planning

In Lane County, Ore., city and county planners are using TV-like display screens connected to IBM computers to examine the effects of decisions about the use of land and services.

Information about each parcel of property—ownership, valuation, current land use code, dimensions, topography, vegetation, and soil type—is stored in an IBM System/370 Model 155 and two IBM System/7s. If a new road is being considered, for example, planners can call up a "picture" of the area, sketch in a proposed route, and determine how much the right-of-way would cost, how many people would be displaced, and what the environmental impact would be. They study alternate routes until they find the most desirable.

Time for a new calendar

The Gregorian Calendar has served most of the world well for nearly 2,000 years. But it's not very precise. The number of days in the months varies ("Thirty days hath September, April, June and November/All the rest have thirty-one . . ."), and most years the same date falls on a different day of the week. Many people have tried to achieve a "standard year," but all have failed, mainly because of an unchangeable natural phenomenon: For the earth to orbit the sun, it takes exactly 365 days, 5 hours, 48 minutes, and 46 seconds.

Now, Father Evarist Kleszcz, a Franciscan priest in Kenosha, Wis., has devised a standard year which he calls an Equitable Calendar. It consists of 364 days divided into 52 weeks. To account for the extra time dictated by nature, which we now handle with a one-day adjustment in February every four years, he would have a "leap week" every five or six years at the end of December.

Through the courtesy of a nearby IBM customer, Father Kleszcz was able to test his theory on an IBM computer. It applied his formula to every year from 1900 through the year 36900 and generated a printout reporting the exact time of the equinox, the precise length of each year, and which years would have "leap weeks."

Father Kleszcz says he hopes to work through the U.N. to get international agreement on his new calendar by January 1, 1978, which he calculates is the next feasible date for making the change.

IL

DUOMO

by Henry White

For 500 years, no one has been able to figure out how Brunelleschi built the dome for the Florence cathedral. A computer is helping to solve the mystery.

From the hills of Florence, in a chill wintry sun, the Arno appears as an occasional silvery trace, largely hidden by the structures that crowd the narrow river's edge. But dominating the city's center is the huge dome of its cathedral, larger than that of the dome of St. Peter's in Rome, much larger than that of St. Paul's in London. For half a millenium that dome has endured as the landmark of Florence, an architectural triumph in a city celebrated for its art, the cradle of the Italian Renaissance. The cathedral, whose vault the dome spans, was started in 1296. It was consecrated in 1436 on completion of the dome, but remained incomplete until 1875 when the present neo-Gothic façade was added.

When architect Filippo Brunelleschi conceived his masterpiece, the colossal dome of the Florentine cathedral, Santa Maria del Fiore, he created a mystery which has piqued scholars' curiosity for centuries. Only today, with the aid of an IBM computer, are the pieces of the 500-year-old puzzle being put together. And in the process, university researchers, together with IBM, may also have developed a new method to help preserve historic buildings of all ages.

In 1418, Brunelleschi—sculptor-goldsmith-mathematician-architect-engineer, and a contemporary of Lorenzo Ghiberti and Cosimo de' Medici—returned to his native Florence from study in Rome to enter a competition to design a dome for the city's cathedral. The enormous unfinished creation of Arnolfo di Cambio, Florence's first great master builder, had been started in 1296. Now it sat like a magnificent, mesmerizing mountain dominating the narrow, crowded streets of medieval Florence, undone, undomed.

Di Cambio had died, and no one knew how he had intended to crown his masterpiece. The cathedral was so vast—270 feet high—that it demanded a vault 138 feet in span. Covering it created special problems. No dome of comparable size had been erected since

Left: The colossal dome spans 138 feet and rises 390 feet. Its construction and condition are being studied with special photographic techniques and computer analysis. From left, Walter Ferri of the Officine Galileo, a firm that makes photographic survey equipment; Francesco Greco of the IBM scientific center in Pisa; and Eugene Cleur of the University of Siena set up photographic equipment on the cathedral's bell tower.

Right: At the IBM scientific center in Pisa, from left, Mario Fondelli of the University of Florence, Greco, Cleur, and Giuseppe Attardi of the University of Pisa study the ribs of the dome on the screen of an IBM 2250 display terminal. Three-dimensional representations of the dome's exterior and interior can be viewed, rotated, and checked with the touch of a light-pen.

From atop the dome, a view of Florence and the famous green and white bell tower designed by Giotto.

classical times. Over the centuries, the classical style of building had been lost, and no one could comprehend how the Greeks and Romans had mastered the challenge of a huge, rounded, unsupported roof. No one until Brunelleschi.

Like so many Florentines of the early Renaissance, Brunelleschi exuded audacity and inventiveness.

As a student of mathematics, he was fascinated by linear perspective and the problems of space. In Rome, he had measured the Pantheon and other classical buildings.

When Brunelleschi won the commission, many Florentines scoffed at his plan to erect a huge dome without employing temporary framework to support the structure during construction. Yet he did it, and even the scoffers marveled at the dome's size and beauty when it was finally completed in 1436.

Its bright russet tiles and white vaulting ribs still dominate the skyline and the surrounding Arno Valley. The dome remains one of the wonders of Renaissance architecture, later inspiring Michelangelo to copy it when creating St. Peter's in Rome. But still it has baffled architects, scientists, and historians who have long puzzled over how Brunelleschi built it without any external scaffolding and how so many hundreds of tons of masonry could be supported by mere vaulting ribs—a series of arches along the sides of an area crossing it diagonally on which the stones can be laid.

It now seems possible, through modern technology, that the mystery will be solved, and, in the solving, the dome and other ancient structures may be preserved from the ravages of time and decay.

The tools for exploring the Brunelleschi dome mystery were a measuring technique called photogrammetry (a combination of photography and plotting) and an IBM computer. The project was initiated by Mario Fondelli, professor of geodetic surveying at the University of Florence.

Photogrammetry has long been used in highway planning, meteorological

forecasting, environmental studies, topography, and surveying. But in surveying the Brunelleschi dome, photogrammetry has been—for the first time—harnessed to the computer.

The first step was to photograph the dome from two different viewpoints with a special kind of camera and the assistance of Walter Ferri of the Officine Galileo in Florence, a leading manufacturer of photogrammetry equipment. The camera was placed at the top of the cathedral's famous Giotto bell tower and then lower down within the bell chamber. From this pair of photographs, or photograms, a stereoptic plotting machine was able to draw an exact three-dimensional reconstruction of the dome with cross sections and relative perspectives. The same procedure was followed to survey the interior.

But thorough analysis of the data involved a vast quantity of numbers and measurements—too much for photogrammetry alone. Fondelli turned to Francesco Greco of IBM's scientific center in Pisa. The two had once worked together on a highway project for the IBM branch in Florence.

To analyze the numerical data from the photograms the two men built a mathematical model of the dome on an IBM computer at the Centro Nazionale Universitario di Calcolo Elettronico in Pisa.

Their studies revealed surprises: The vaulting ribs supporting the huge dome are elliptical and not, as earlier studies suggested, shaped in the arc of a circle; the dome's octagonal base is irregular; and the dome is on an inclining axis. Further, statistician Eugene Cleur of the University of Siena discovered irregularities in the dome's ribs which could have been caused by a special technique used to eliminate supporting armatures during construction and replace them with small barrel vaults, or deep three-dimensional arches, between one spur and the next. These discoveries cast important new light on the genius and originality of Brunelleschi and his revolutionary building techniques.

The IBM computer has helped analyze the current condition of *il Duomo's* dome. "Our study shows that the dome is still in very good shape," says Fondelli, "but it has also uncovered old cracks in the masonry, as well as more recent lifting of the plaster on the frescoed interior surface of the dome. This gives an early warning of possible problems and enables us to take corrective action."

Greco and his colleagues in Pisa study a three-dimensional representation of the dome's interior and exterior on the screen of an IBM 2250 display terminal. The dome is rotated. A particular rib is selected for study. And with the touch of a light-pen, the state of that rib is thoroughly checked.

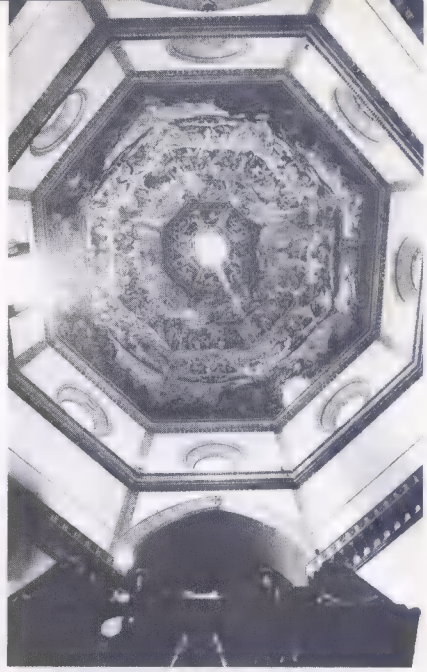
In comparison with former surveys, the speed with which photogrammetric surveys can be made is striking—several days instead of many laborious months. Fondelli views the technique as an invaluable safeguard for any building intended for preservation. "It can be done as a routine matter," he says. "The data would form part of a central computer file on each historic building, including all available information."

Greco stresses the benefits of continual updating. "Until now, there have been few surveys—even for ancient buildings of the greatest historic importance. Now we have an easy method not only to survey, but also to compare results from year to year. For the Brunelleschi dome, we have data stored on the surveys conducted in 1968 and 1972 and on an ancient wooden model of the dome kept in the cathedral museum—all three ready for instant comparison. As our data mounts, we will be able to delve instantly into the causes of decay."

The Brunelleschi dome project has drawn considerable worldwide interest among architectural researchers, historians, and conservationists. Professor Fondelli is researching ways to conserve paintings using the same techniques, and he has been asked by Italy's National Research Council to survey the external sculptures on St. Mark's Basilica in Venice.

Given the speed and accuracy of the photogram technique linked with the computer's ability to analyze accurately and completely enormous volumes of data, it seems likely that this technique will be fundamental to future architectural conservation as well as the preservation of works of art. ■

Henry White, an Englishman who has visited Florence twice, is a freelance writer and film-maker based in New York.



An interior view of the dome, looking directly up at the cupola. Researchers analyzed photographic data and built a mathematical model of the dome—inside and out—with an IBM computer.

Ferri and Greco photograph the dome from lower in the bell tower. Greco believes that computer analysis of structural data will help in the preservation of historic buildings by pinpointing the causes of decay.

People in politics

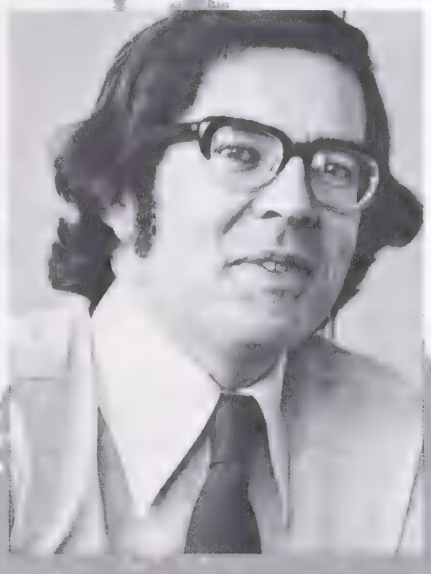
In the U.K. general election four years ago, IBMer Gerry Wade acted as personal assistant to one of the most highly respected members of the Tory cabinet, the late Iain MacLeod. This year, he fought two election campaigns in his own right, as Conservative candidate for the Labour-held West London constituency of Putney. He lost by only a narrow margin.

On his route into politics, Wade has been national vice chairman as well as a branch chairman of Young Conservatives. But he does not conform to the widely held, though outdated, image of the established order. On the other hand, he is far from typical of the emerging breed of young Tory: pragmatic, more radical than reactionary, nonestablishment.

The 32-year-old Dublin-born bachelor is strongly pro-Europe. He believes that Britain's future lies with the European Economic Community and that withdrawal from the EEC would be "disastrous." One of his meetings was chaired by a Swedish politician, emphasizing the European theme of his campaign.

Another of his meetings was chaired by Tim Rice, co-writer of the hit musical, *Jesus Christ Superstar.* Rice is a personal friend of Wade's.

While most M.P.'s have a slogan or two to draw the voters, Wade went one better in his October campaign. He had an election song entitled *We Want Wade* especially written for him by an IBM friend. It was professionally recorded and played at all his meetings.



"I joined the Scottish Nationalist Party 10 years ago," explains 32-year-old Charlie Cameron, "because I saw the

Six years as a full-time Liberal Party worker ("agent") gave Mike Simpson ample experience to handle his own campaign last October for a Labour-held seat in the Mitcham and Morden area, near London. Like many other members of his party, he suffered from the country-wide swing away from the Liberals and finished third in a five-candidate race.

What prompted Simpson to run? "I was convinced that people who have an interest in politics should be prepared to get involved. I also had a perennial feeling, born during my years as an agent, that if they can do it, so can I."

With IBM since 1968, Simpson has devoted much of his spare time to his party, acting first as secretary, then chairman in the Carshalton-Walling constituency near London. He also sat on a national subcommittee controlling the finances of the party publications division.

Simpson was pessimistic about Britain's future during his campaign. One of his themes was the urgent need for swift action to get the country out of its serious economic crisis.

Married, and the father of three daughters, Simpson says: "I was in the

IBM United Kingdom is a company of some 13,000 employees. During the parliamentary elections last October which Labor won by three seats, five IBM U.K. employees stood for the House of Commons. Two were Conservatives, one a Liberal, the remaining two, members of the Scottish Nationalist Party. None were elected, though chances are that some may have a go at it again in the next election. In the U.S., where IBM has 155,000 employees, a comparable turnout would have seen some 60 employees running for seats in Congress. Here are the British candidates, and some of the views they expressed in that campaign.

logic of its argument on nationhood for Scotland and the opportunities for us to make our own decisions."

In the beginning, Cameron rewrote a basic economic text on Scotland and produced a paper on the quality of Scottish life for the S.N.P. National Assembly, parts of which were incorporated into party policy.

This year, he ran for Parliament in the Labour stronghold of Renfrewshire West, an area of villages and seaside towns where many IBM people from the Greenock plant live. Despite the fact that he lost, Cameron pushed the S.N.P. vote up by 11,000 votes over the last election to 15,000, closing in on the 20,000 Labour figure.

Cameron joined IBM's Greenock manufacturing plant in 1969. He sees a big plus for his party in the discovery of vast amounts of North Sea oil off the coast of east Scotland. "Obviously this has won the economic argument for us," he says. "Scotland without doubt, is capable of standing on its own financial feet. This has made a fantastic difference to us as a party."

U.S. when the election date was set for October 10. I got back just in time to run my campaign."

One might assume that Sean Murphy, married, and the father of eight children, has no time to spare. But at the Greenock manufacturing plant, Murphy, 41, has a reputation for a fast-moving approach to his job. "If you see Sean, nail him down 'til I get there," is the password at the plant.

Murphy ran, unsuccessfully, in two 1974 elections for the Scottish Nationalist Party in picturesque Bute and North Ayrshire.

In October, he took votes from both Conservative and Liberal candidates, increasing his February results by nearly 3,000 votes. In both elections, he more than doubled his party's previous votes. The losses have left him undaunted and determined to try again, he says.

"I was living in London when I joined S.N.P. over 10 years ago," he says. "It was a return visit to Scotland that persuaded me. It's very easy for the emigre Scot to contrast one part of the world with back home—to see the difference in standards. I was struck by how the Constitution was not working for Scotland. I decided that the only way to change its provincial society was to stop Scotland from being a province."

Murphy began work for IBM almost 20 years ago in London.

Last spring he visited Greenock assignees in the United States, taking with him a requested supply of S.N.P. badges. "There was such great interest," he says, "I ran out after visiting the second IBM location."

At 28, Robert Atkins could have been one of Britain's youngest M.P.'s. A Conservative candidate for Luton West in 1972, Atkins found himself fighting to win his first election when Prime Minister Edward Heath asked for—but failed to get—the support of the country last February. Losing to the Labour candidate by 5,000 votes, Atkins had a second chance in October, but, again, the result (a loss by 6,500 votes) reflected the national swing away from the Conservatives.

One of Atkins' chief aims in both his campaigns was to deflate what he describes as the widely held but mistaken assumption that, as Tory candidate, he must be rich and privileged. "I concentrated on projecting myself as an ordinary, young married man facing the same problems as anyone else in Britain today," says the London-based IBMer. "It was a very personal campaign."

As a young candidate, he hoped to attract newly eligible 18-year-old voters to his side, but was dismayed by the apathy he met in that age group. "I sent out 1,300 personally signed invitations to young people to come and talk informally at a local pub. Not one person turned up."

Atkins first became active in politics in 1964—before he was of voting age—when he worked for the local Tory candidate.

He was a prominent member of the Young Conservatives and vice chairman of the Greater London Young Conservatives when IBMer Gerry Wade was chairman. He also chaired the housing committee of his local Council, to which he was elected in 1968, and was a governor of Hornsea College of Art at a time of student unrest and sit-ins.

A rare glimpse into a half-million years of Chinese history is being offered for the first time in the U.S. this month with a display in the nation's capital of 365 objects excavated in The People's Republic of China. The exhibit at the National Gallery of Art will continue through March 30. There are prancing bronze horses, pottery figures of acrobats, fragments of brightly colored silk damask, ritual vessels, weapons, and ordinary workaday implements. They reveal the art, technology, religion, farming methods, and amusements characterizing Chinese culture since man's earliest days on the Asian Continent.

The visit of the exhibit to the U.S. is a further development of cultural exchanges between the U.S. and The People's Republic of China. Preliminary agreement for it was worked out during Secretary of State Kissinger's visit to The People's Republic in the fall of 1973. It has been seen, outside of China, only in France, England, Austria, Sweden, and Canada. IBM has helped bring the exhibit to the U.S. through a grant to the National Gallery.

Delicacy of expression and rich and exact ornament distinguish an image of the Guanshiyin Kneeling, a Buddhist deity, belonging to the Yuan Dynasty, A.D. 1271–1368. The ancient porcelain was unearthed near Peking in 1955.

The graceful ewer and bowl for warming wine date from the 12th or 13th Century A.D. The porcelain pieces, glazed light blue, are ch'ing-pai ware excavated in 1963 at Ho-jung, Anhui, in central China.

Bronze figures of two tigers and a boar, locked in combat, were excavated in 1955-60 from a tomb at Shih-chai-shan, Yunnan, in southwestern China. They belong to the Western Han dynasty which flourished in the 2nd and early 1st Century B.C.

Nearly two feet high, the ceramic horse, decorated in three-color glaze, is the largest and finest of the retinue placed in the grave of a 19-year-old prince of the T'ang dynasty, A.D. 701. It was excavated in 1972 at Ch'ien-hsien in northwestern China. The harness ornaments are Iranian in style.

A huntsman often carried a trained cheetah on the rump of his mount. This painted ceramic piece from the T'ang dynasty, A.D. 706, was discovered in 1964 in the tomb of Princess Yung T'ai at Ch'ien-hsien, Shensi.

Dragons writhe in the clouds in the design on a gilded bronze vase fashioned by a skilled craftsman of the Western Han dynasty between the 2nd Century B.C. and 113 B.C. It was discovered in 1968 in the tomb of Prince Liu Sheng at Mancheng in northern China.

A warhorse driving a carriage chariot was one of 177 objects found in the tomb of a cavalry commander at Wu-Wei in Kansu, western China, in 1969. The bronze model dates from the Eastern Han dynasty: 2nd Century A.D. The rank of an official was judged by the number of carriages in his train, and models were buried with him.

HOW TO GO TO COLLEGE WITHOUT GOING BROKE

by Geoffrey D. Austrian

Each year, Christmas vacation becomes a busy time for high school students who have waited until the last minute to complete college applications.

This year, an estimated 1.8 million youngsters, including an untold number of sons and daughters of IBM *employees, will weather the ritualistic writing of essays on what they hope to get out of college and rounding up recommendations from teachers. Then the wait begins.*

But getting into college these days is only part of the effort. Often more worrisome, for students and parents alike, is how to cope with the rising cost of a college education.

Not long ago, the big question was "how to get into college." Athough that's still a concern at many schools, the much bigger question, facing students and parents today, is how to survive the bills that sweep in once you are accepted by the college of your choice. Following a decade of relative prosperity that took off with the launching of Sputnik in 1957, educators speak glumly of a "new depression" in higher education. While many formerly tidy campuses are going unkempt—and scores of small private colleges have closed their doors—the price tag for a college education is, in many cases, rapidly outrunning the capacity of middle-income parents to pay.

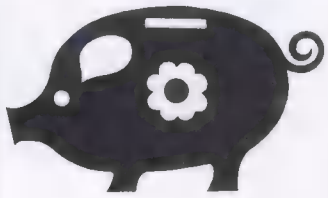
Costs for the colleges themselves, according to a recent survey, have gone up twice as fast over the past decade as the cost of living itself. And while the bills you pay for attending college have risen at a somewhat slower rate, the cost of going to a private college has climbed 5 percent faster than the Consumer Price Index, and those for a state resident at a public college, 7 percent faster than the C.P.I., in the last 5 years. Today, paying for college is the biggest single investment that many U.S. families decide to make.

That's the bad news.

The good news is that if you are really determined to get a college education—and the 1.78 million freshmen who entered college this fall matched the all-time high set in 1970—the present crisis is spawning more ways of financing your way through college than ever before. But first, you and your parents must set your sights.

"It's absolutely essential," says Howard Greene, an educational consultant, "that students know how much their families are willing and able to provide —and what will be expected of them. Only through frank discussion can par-

PARENTS START SAVING



HIT THE BOOKS IN HIGH SCHOOL

START SAVING FOR OWN CHILDREN'S EDUCATION

SALT AWAY $$ OVER SUMMER

ents and students make a realistic choice of colleges—and fully understand their respective obligations."

The decisions you face involve:

—choosing the college itself;

—deciding the manner in which you will attend;

—finding the types of aid you can get from the college; and

—sorting through the growing variety of help that can be gotten from Federal, state, and private sources, as well as deciding what you can earn.

To begin with, how much does college cost?

Not counting books, supplies, transportation, and personal expenses, which can run up to $1,000, the average total budget (tuition, fees, room, and board) for a four-year private college for the current academic year is $3,159.* Harvard and Yale cost $5,350; Bryn Mawr, $4,825; M.I.T., $5,270; Notre Dame, $3,866; and the University of Chicago, $4,842. Colleges outside of the Northeast are often less. Davidson costs $3,685; Southern Methodist University, $3,323; Westminster College, $3,320; Wheaton (Ill.), $3,486; and Brigham Young University, $1,895 ($320 less if you happen to belong to the Church of Jesus Christ of Latter-day Saints).

Half of U.S. students have traditionally attended private institutions—but the figure has dropped to less than 25 percent today. The reason: Many tax-supported public institutions, such as the large state universities, offer a first-rate education, comparing with leading private schools, and are a much better bargain to boot. Even for out-of-staters, who pay an extra fee, they often cost substantially less, a fact that educators say has led to a dual pricing system for higher education.

Not counting books, supplies, transportation, and personal expenses, the cost of public colleges averages $1,513, about half the cost of a private college—with an additional $835 charge for students from other states. Some typical costs, with the *extra* fee for out-of-staters noted after, are: University of Connecticut, $1,940 ($1,000); University of Illinois, $1,928 ($1,112); University of Wisconsin, $1,755 ($1,356). Costs at the State University of New York, the largest state system, vary slightly by campus, but average just under $2,000 with $150 added for juniors and seniors. Out-of-staters generally pay $425 more.

With flat or declining enrollments in prospect for the long-term future, many public and private institutions are trying to hold the line on charges despite rising costs. Although it may be sometime before a "buyer's market" emerges, the best advice is to shop around.

Besides holding down costs through your initial choice of a college, you can also reduce expenses by deciding the way you attend. Obviously, living at home can cut costs substantially. But it is easy for parents to forget that food and clothing expense do not simply disappear because you are living at home. Another alternative is to attend a local two-year college, then transfer to a residential college. Many four-year institutions accept a substantial number of transfers at the third-year level and are receptive to community college graduates with good records.

Still another choice is to shorten or stretch out attendance to lower the cost of college. For example, it is possible to squeeze four years of college into three (and save up to a quarter of the cost of college) in a number of ways. Thousands of high schools now offer "advanced placement" college-level courses through which

*Information on costs for colleges is from a survey conducted by the Life Insurance and Research Association, Hartford, Conn.

MOTHER GETS A JOB

TUITION TIME ANTE UP!

BECOME A CATALOG COLLECTOR

KNOW YOUR GOALS AND $$ LIMITATIONS

STATE COLLEGE OR PRIVATE SCHOOL?

you may be able to earn sophomore standing on entering college by qualifying on official advanced placement exams.

Similarly, you may be able to get a running start by taking college-level courses at a local community college or at college summer schools. But be sure to check in advance to find out if the credits are acceptable at the college you want to attend. Some colleges also offer specially structured three-year programs that can save a year's expense.

Stretching out the length of a college education—while earning along the way—is another means of reducing costs. Here, too, you have a number of alternatives.

Some 370 institutions offer cooperative education courses. In these, you alternate between full-time study and full-time work related to your field of study. Graduation usually takes five years. But, by the time you get out, you will have earned about two-thirds of your tuition costs and put a year's practical experience under your belt. In a co-op program at Pennsylvania's Drexel University, for example, science and engineering students spend from 18 to 21 months working in industry. By the time they complete the five-year program, they may have earned $10,000 or more of the $11,000 tuition cost.

Another way to lighten the financial load is to take a year off, either before starting college or partway through. An increasing number of colleges are offering deferred admission. That is, you get in, then have the choice of putting off your attendance for a year. The "admit-you-now, see-you-later" arrangement lets you save up money, if you can line up a good job, while resting assured that a place has been reserved for you.

Increasingly common, also, is "stopping out," or taking a year or a semester off part way through the four years. Although "stopping out" may be less desirable since it breaks the continuity of your studies, it can substantially ease financial pressures for families with two or more students in college at the same time. Some colleges even help the stop-outer find employment.

In addition to actions you can take, the colleges themselves are trying to do more to ease financial pressures on middle-income families. For instance, at a group of nine New England colleges studied under a Sloan Foundation grant, it was found that more than 40 percent of the students held down campus jobs, earning an average of $400 during the academic year.

College aid comes in many forms, from offers of part-time or summer employment, to loans from the colleges' own funds, to making monies available from private and government sources.

Typically, a college will offer a package of various types of financial aid. But to get any of it, you must first apply to the college. And the best advice is to apply early. "The worst situations that arise," says Howard Greene, "come about when families fail to apply for financial aid in the mistaken notion that doing so will somehow hurt their son's or daughter's chances of being accepted. It can prove traumatic when the acceptance comes after the college has already distributed all of its aid resources."

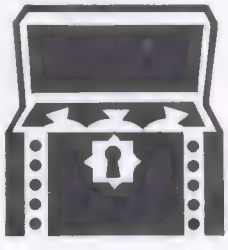
Most colleges ask the applicant's family to fill out a "Parents' Confidential Statement" listing family income, assets, expenses, and debts. This information is sent to the College Scholarship Service (CSS) of the College Entrance Examination Board. CSS, in turn, sends an estimate of how much the family can pay to each college and scholarship sponsor the family has named.

The college aid officer may adjust the CSS recommendation upward or downward depending on his judgment and college policy. If the college decides there's a gap between what your family can pay and your total college budget, the officer will try to close it by offering various types of aid.

MAKE THE SCENE ON CAMPUSES

APPLY—AND HOLD YOUR BREATH

GET A PART-TIME JOB IN COLLEGE



WIN A SCHOLARSHIP

Drawing by Handelsman; © 1974 The New Yorker Magazine, Inc.

"Good day, Madam. I'm working my son's way through college."

Struggling to meet their own rising costs and also help low-income students, few colleges today can offer as much financial aid as they would like to middle-income family students. But it is also true that requests for financial aid have been falling off at some private colleges. "Many middle-class parents," *The New York Times* reported earlier this year, "apparently convinced that only the children of the poor can qualify for scholarships, are giving up on private colleges . . . even though . . . they might be eligible for financial aid, too."

Encouraging for inflation-squeezed, middle-income families is that the private nonprofit organizations and government agencies that set aid formulas have recently eased the eligibility requirement for middle- and even upper-middle-income families. In some instances, a student whose family is earning close to $30,000 a year may qualify for some help. States, too, are liberalizing their rules for students attending both public and private colleges.

By far the most important source of aid to students from middle-income families is the Guaranteed Student Loan Program created under the Higher Education Act of 1965.

More than $6.9-billion has been pumped into the program. And loans have been made to some 3.5 million students, attending more than 8,200 eligible educational institutions, through 20,000 banks, savings and loan associations, credit unions, and other financial institutions.

Under the Guaranteed Student Loan Program, subsidized guaranteed student loans of up to $2,500 a year may be granted in most states to students with adjusted gross family incomes up to $15,000. However, some families in the $20,000 bracket may qualify, since the adjusted figure is derived by subtracting 10 percent and $750 for each member of the family from total income. The student borrower who qualifies starts paying 7 percent interest 9 to 12 months *after* leaving college, with repayment of the loan extending up to 10 years.

Families with adjusted gross incomes as high as $30,000 may still qualify for *unsubsidized* guaranteed student loans at 7 percent interest. And you make payments *only* on the interest while in college.

A number of banks are also offering special student loan plans that can spread the cost of a college education. And regular commercial loans are sometimes taken out by families at higher rates. But no lender in any program is obliged to lend you money. If interested, you should start shopping early.

Although the emphasis on student loans is a major new trend, it is a good idea not to overlook more traditional scholarship aid such as the National Merit Scholarships (including the Thomas J. Watson Memorial Scholarships) and the National Achievement Scholarships for Outstanding Negro

Where to go for additional information

General college guides

The College Handbook, edited by Douglas D. Dillenbeck and Sue Wetzel, in 2 volumes. College Entrance Examination Board. Write College Board Publication Orders, Box 2815, Princeton, N.J. 08540.

Barron's Profile of American Colleges, Barron's Educational Series, Woodbury, N.Y. 11797. Vol. 1, Description of the Colleges. Vol. II, Index to Major Areas of Study.

Junior College Directory, American Association of Junior Colleges, 1315 Sixteenth Street, N.W., Washington, D.C. 20036.

Guides to financing

Scholarships, Fellowships and Loans, by S. Norman Feingold, Bellman Publishing Co., Arlington, Mass. 02174.

Financial Aids for Undergraduate Students, edited by Lewis D. Hall, College Opportunities, Inc., 492 Pedretti Street, Cincinnati, Ohio 42538.

Student Expenses at Postsecondary Institutions, published annually by College Scholarship Service of the College Entrance Examination Board, College Board Publication Orders, Box 2815, Princeton, N.J. 08540.

Meeting College Costs in 1975-'76; A Guide for Students and Parents, offers guidelines for computing college expenses and on how colleges determine financial aid. Free from College Scholarship Service or through schools.

Making It—A Guide to Student Finances, covers financial aid, student employment, and student-run small businesses, by Harvard Student Agencies, Inc., E. P. Dutton and Co., 201 Park Ave. South, New York, N.Y. 10003.

Undergraduate Programs of Cooperative Education in the United States and Canada, by the Cooperative Education Research Center, Northeastern University, National Commission for Cooperative Education, 52 Vanderbilt Ave., New York, N.Y. 11017 (free).

Scaling the Ivy Walls, by Howard Greene and Robert Minton, to be published in February 1975 by Abelard-Schumann, Ltd., 257 Park Ave. South, New York, N.Y. 10003.

Government financial aid programs

For information on U.S. programs, write your congressman. For state programs, write your state representative or state department of education.

U.S. Office of Education: Two grant programs are offered to students from low-income families. They are the Basic Educational Opportunity Grant and the Supplemental Educational Opportunity Grant programs. Of greater interest to middle-income families are the National Direct Student Loan Program, administered through the colleges, and the Guaranteed Student Loan Program, available mainly through banks and other financial institutions.

- National Direct Student Loan Program: Offered as part of a college's financial aid package to students who can demonstrate a need. Up to $2,500 while enrolled in a vocational school or first two years of a degree program; up to $5,000 while studying for a bachelor's degree. Repayments start 9 months after graduation or leaving school. Interest is 3 percent on unpaid balance during repayment which may take up to 10 years.

  No payments required up to three years while serving in the Armed Forces, Peace Corps, or VISTA. Loan is cancelled for those who become teachers of the handicapped; teachers in inner-city schools; and servicemen spending one year in combat.
- Guaranteed Student Loan Program: No

Students. Most scholarships today are pegged to need as well as ability. But there is a tendency toward awarding more scholarships on the basis of ability alone—an important development for students from middle-income families. Your school guidance counselor or principal is generally the best source of information about locally available scholarships. But don't stop there. A vast variety of scholarships and grants are offered by individuals, business organizations, college clubs, and religious, fraternal, veterans, and professional groups.

Judging from the past, it is safe to say that college costs will go still higher in the future. The U.S. Office of Education estimates that basic costs for four years at a private college will reach $20,000 by 1978, and $26,000 by 1983. Comparable figures for a typical state university will be $9,000 by 1978, and $12,000 by 1983.

For families with children several years away from college—or still in diapers—the time to start saving is now, if they can. They may be able to set aside more by opening a custodial savings account in the child's name. Or creating a temporary trust — a legal arrangement under which income-producing securities are set aside to accumulate income to pay for the child's education, and later revert to the parents' control. The advantage is that income earned for the child is not taxed at the parents' upper bracket rate and may not be enough to be taxed at all. But they should definitely get professional advice from a lawyer or banker first.

For those less foresighted or unable to save, a number of colleges have come up with plans that enable students to finance college over a good part of their earning years. At Yale, for example, students may defer paying a portion of their tuition costs in exchange for a pledge to pay a fixed percentage of annual income for as long as 35 years after graduation—or until your class's "group obligation" has been met. Duke has a comparable plan.

Is it worth it to mortgage your future for the sake of a college education? Perhaps. But some educators question if it is fair for society to allow young people to go heavily into debt when older generations were able to pay college costs when they were incurred.

Only one thing is certain. There is no easy solution in sight to the problem of paying for college. The decision may mean giving up vacation trips, refinancing a mortgage, a mother going to work, or a father taking on a second job. But thousands of families are doing it. Only you and your parents—or you alone—can decide the sacrifices you are willing to make. ■

Joseph Boldt, a freelance writer who has had first-hand experience in paying college bills, gathered much of the information and assisted in the preparation of this article.

Shopping for financial aid—by computer

How much does college cost? What financial aid may be available? What are your chances of qualifying for it?

Today a growing number of high school and community college students are able to receive prompt answers to these questions without bothering to visit far-off campuses or writing numerous inquiries. They do their preliminary comparison shopping on an IBM computer by means of CVIS, a computer program developed at Willowbrook High School at Villa Park, Ill.

Although CVIS, which stands for Computerized Vocational Information System, is designed mainly to furnish occupational information, it also contains related information on 1,510 four-year U.S. colleges and 172 types of financial aid (not including aid offered by specific colleges).

"A student indicates his or her eligibility, or lack of it, in 15 areas when seeking financial aid," says John Sanders, program administrator, DPD Education Industry Marketing. "The areas include parents' business or professional affiliation, and the student's field of interest, such as science or music. By entering this information into a terminal," he adds, "students get back names of scholarships or aid programs for which they may be eligible." CVIS is currently being used by some 40 school districts throughout the U.S. ■

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income ceiling applies to guaranteed loans except where Government subsidizes interest while student is in school. Applicant for subsidized or unsubsidized loan must be enrolled at least half-time in an eligible college, school of nursing, vocational, technical, trade, business, or home-study school. All borrowers must submit certification of acceptance from the school when applying to the bank, also an affidavit that loan will be used only for educational purposes.

Applicant for subsidized loan must supply the lender with recommendation from financial aid office of the amount needed. Families with an adjusted gross of less than $15,000 (gross income, minus 10 percent, minus $750 for each dependent) qualify automatically. For others, college aid officer recommends amount.

Although amount may vary with state, maximum loans are $1,500 to $2,500 annually to a total of $7,500 for undergraduate or vocational study and $10,000 including graduate study. Interest is 7 percent.

Repayment starts 9 to 12 months after graduation with minimum repayments of $360 a year. Repayment may be deferred up to 3 years while serving in the Armed Forces, Peace Corps, or VISTA, or upon return to full-time study.

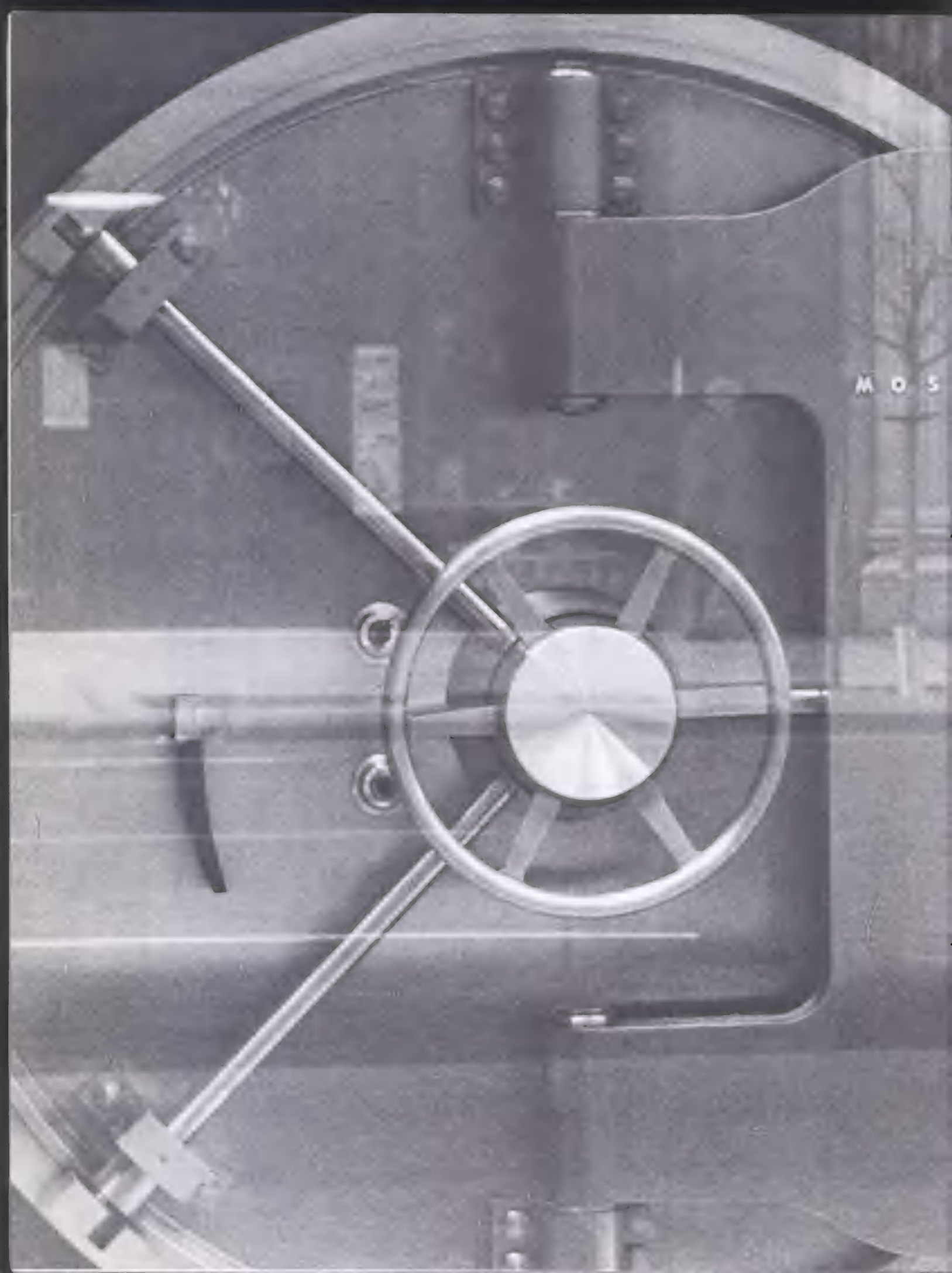
Armed Services Programs: The U.S. Army, Navy, and Air Force offer four-year scholarships at many colleges to students interested in careers as officers. Most programs cover full costs of tuition, fees, and books, plus a monthly allowance for living expenses. Recipients agree to active service for from three to six years following graduation. Third- and fourth-year students enrolled in advanced R.O.T.C. programs also receive monthly stipends. For information, write to:

- Office of the Chief, Reserve Components, Department of the Army, Washington, D.C. 20305.
- Bureau of Naval Personnel, Department of the Navy, Washington, D.C. 20380.
- Commandant, Air Force R.O.T.C., Maxwell Air Force Base, Alabama 36112.

Social Security Benefits: Benefits may include scholarship aid. To qualify, a student must be the son or daughter of a deceased, disabled, or retired worker under Social Security; under 22, unmarried, and a full-time student. Benefits range up to $130 a month if parent is disabled or retired; up to $199 if parent is deceased. Consult your local area Social Security Office or write: Social Security Administration, U.S. Department of Health, Education and Welfare, Washington, D.C. 20402.

State Programs: Many states make tuition grants available to students attending colleges in the state, generally on the basis of need. New York's new Tuition Assistance Program provides some aid for students with family incomes under $20,000. (Family net taxable income on which aid is figured is reduced $3,000 for one family member in college and $2,000 for each additional family member in college.) New York also authorizes payment of four-sevenths of the interest on Federally guaranteed loans for students who do *not* qualify for a Federal interest subsidy and whose adjusted family income, as computed under the Guaranteed Student Loan Program, is less than $30,000. For information, write the New York Higher Education Assistance Corp., 50 Wolf Road, Albany, N.Y. 12205.

Information for this appendix was compiled with the assistance of Howard Greene Associates.


MOS

DEBT

Debt is necessary to the growth of an economy but it can get to be too much of a good thing

Ever had the uneasy feeling that maybe you've taken on more debt than you should—especially in this uncertain period of recession and double-digit interest charges?

If so, you have lots of company among American consumers—and in the board rooms of some corporations.

Debt in the United States is now up to a staggering $2.5-trillion. Interest charges, alone, says *Business Week,* amount to about $170-billion or one-third the Japanese gross national product.

Consumer debt accounts for $200-billion. State and local debt, another $200-billion. The Federal Government, $500-billion. Mortgage debt, $600-billion. But the biggest borrower, by far is American business. Corporate debt adds up to over $1-trillion.

Reason enough for *Business Week* to call the U.S. economy "the Debt Economy without peer." Never in the whole human history of debt and debtors has so much been owed by so many to so many under the umbrella of so sophisticated a financial system.

Depending on how you view it, that mountain of U.S. debt is both good and bad. For nearly three postwar decades, it has helped fuel an unparalleled economic boom at home while seeding industrial growth abroad.

But in the present day world of inflation, mounting talk of a worsening recession, and the awesome problems posed by the soaring price of oil, some

bankers and analysts see it as a worrisome, perhaps even ominous burden.

For while most economists, says *The Wall Street Journal,* hold that fears of a worldwide depression are overblown, a prolonged period of economic contraction in the U.S. could prove awkward to some corporate debtors. This is especially true of companies, already burdened with debt, who look to constant expansion in the economy to generate the additional business they must count on to maintain their cash flow.

Few corporations can be—or, indeed, would want to be—entirely debt free. For if a corporation is to grow, it must—more often than not—borrow the capital required to develop products, build plants, and move those products to market.

Some more profitable, more fortunate companies accumulate capital for growth out of their retained earnings. These retained earnings are those which are left after the payment of dividends to stockholders. But most corporations find it necessary to borrow by selling bonds or by going to the banks—and more frequently than not, it's a combination of the two. Borrowed capital of this kind can provide leverage for growth by making use of other people's money. Thus, a company can grow on borrowed money without having to dilute the ownership of its stockholders, as it would if it were to issue stock for capital funds. The issuance of additional stock provides capital for the corporation but it also divides the ownership among more stockholders. It cuts the pie into that many additional pieces.

However, while debt is acceptable and, indeed, necessary in most instances, corporations—like families—can go *too* heavily into debt. And should they find themselves overextended at the time of a downturn in the economy or a reversal in the business, their lack of liquidity could produce difficulties in meeting their interest payments or in refinancing their debt.

One of the most commonly used measures of corporate vulnerability is debt as a percent of equity—or what finance people call the debt-equity ratio. Debt, in this measure, includes both *long-* and *short-term* debt. Equity includes common stock, capital surplus, and retained earnings.

Until the last 50 years or so, debt to most Americans simply meant living beyond your means. And, indeed, until Keynesian economics came along with the Great Depression of the 1930s, a balanced Federal budget rivaled cleanliness in the next-to-godliness order of things.

Actually, the odium on debt goes back to Biblical times. And few high school students will ever forget what Polonius had to say in Shakespeare's *Hamlet* when he charged his son, "Neither a borrower, nor a lender be; / For loan oft loses both itself and friend, . . ."

Obviously, debt has come a long way since then.

Without it, an industrial economy could not get started—much less flourish.

In an economy like that of the United States, one person's savings are another person's debt. If you save money and put it in a bank, the bank becomes your debtor. Even if you stuff it in the mattress, the government remains your debtor for it guarantees that paper as legal tender in the payment of private and public debts.

Inevitably, therefore, any economy that saves a lot has to be a high-debt economy. Savings, for example, are cycled into a variety of forms of financial assets through bank loans and investments. A bank provides money for the building of a plant. That plant becomes an asset, contributing by its production to the strength of the economy. But it also represents a debt owed by the company to the bank, and a debt owed by the bank to those depositors who lent it their savings.

In the modern-day world, it's no longer money that makes the world go round. Polonius notwithstanding, it's debt.

Earlier this fall, *Newsweek* observed with concern—if not alarm—that since 1955 the debt-equity ratio of U.S. companies had climbed from 21 percent to nearly 44. Or to put it another way, corporations were in debt to the tune of 21 cents for each dollar of equity two decades ago, and now that ratio has doubled.

A more recently published study prepared for *Business Week* by Investors Management Sciences, a Denver-based subsidiary of Standard and Poor's Corporation, illustrates the persistent trend upward in the debt-equity ratio of U.S. companies.

The report covered the 500 largest nonfinancial corporations in the U.S.

- Of the 500, some three-fifths, or 292 companies, had a debt-equity ratio in excess of 50 percent.
- Of the 208 companies with sales of over $1-billion, 44 had a debt-equity ratio in excess of 100 percent.
- Of the 292 with sales of from $300-million to $1-billion, 67 had a debt-equity ratio of over 100 percent.
- Among the 500, there were 23 companies with a debt-equity ratio of 200 percent or more; nine with a debt-equity ratio of 300 percent or more. One was up to 799 percent.

In the light of this growing interest in liquidity, what kind of position does IBM find itself in?

- IBM's debt-equity ratio as of June 30 stood at approximately 6 percent. This means that the company's debt to banks and other institutions amounts to about a nickel for each dollar of equity in the corporation. Of the 100 largest nonfinancial corporations in the U.S., only three were in a comparable position—Eastman Kodak with a debt-equity ratio of 5 percent; Coca Cola and American Home Products with 3 percent each.
- There has been relatively little dilution of stockholders' equity. The company has gone to the equity market

only five times since 1920. Of the 147 million IBM shares now outstanding, 93 percent were created by stock splits and stock dividends.

- The company's phenomenal growth of the last 20 years (from a gross income of $497-million in 1953 to $11-billion in 1973) has been financed largely out of retained earnings.
- During the last ten years alone, IBM has invested $5-billion of its earnings in the business.

Take the company's financial statement for last year. Net earnings after taxes amounted to $1.6-billion. Of that, $654-million was distributed to stockholders, worldwide, in dividend payments.

The remainder was reinvested in the business.

Concern over the liquidity of U.S. corporations has been stimulated, in part, by the doomsday talk about what could happen as a result of sharply increased oil prices; in part, by inflation and by a spreading economic downturn which has already resulted in a decline in U.S. production of almost 3 percent.

Nevertheless, according to financial journals, U.S. businessmen continue to display a cautious optimism in their corporate planning. Capital expenditures next year, for example, have been budgeted at $125-billion. The dollar figure is higher than that for 1974, but when inflation is taken into account the real expenditure is unchanged.

Meanwhile, economic estimates in the U.S. generally range from gloom and despair—some 51 percent of consumers, for example, see the country moving in the direction of a depression—to more bullish economists who look for an upturn sometime in mid-1975.

But because the situation is unprecedented, there are many who probably side with Norman Robertson, senior vice president and chief economist of the Pittsburgh Mellon Bank.

Asked for his views by *The Wall Street Journal,* he replied, "Everyone thinks that things will work out."

Pause.

"But no one is precisely sure how." ■

Adela

It stands for Agency for the Development of Latin America. Now celebrating its 10th birthday, it offers help to emerging nations.

Can a profit-making venture serve as a catalyst for economic development in an area of the world that is not always receptive to free enterprise?

The answer appears to be a resounding yes if the name of the organization happens to be ADELA, and the area Latin America. And as ADELA (the initials stand for *A*gency for the *De*velopment of *L*atin *A*merica) celebrates its tenth birthday, the organization finds itself serving as a prototype for similar private investment efforts in other less developed areas.

The ADELA approach, according to a recent United Nations report, combines three distinct elements: an international source of capital; association with local public or private interests; and, the switch from well-established projects, once they are under way, to reinvest profits in new ventures.

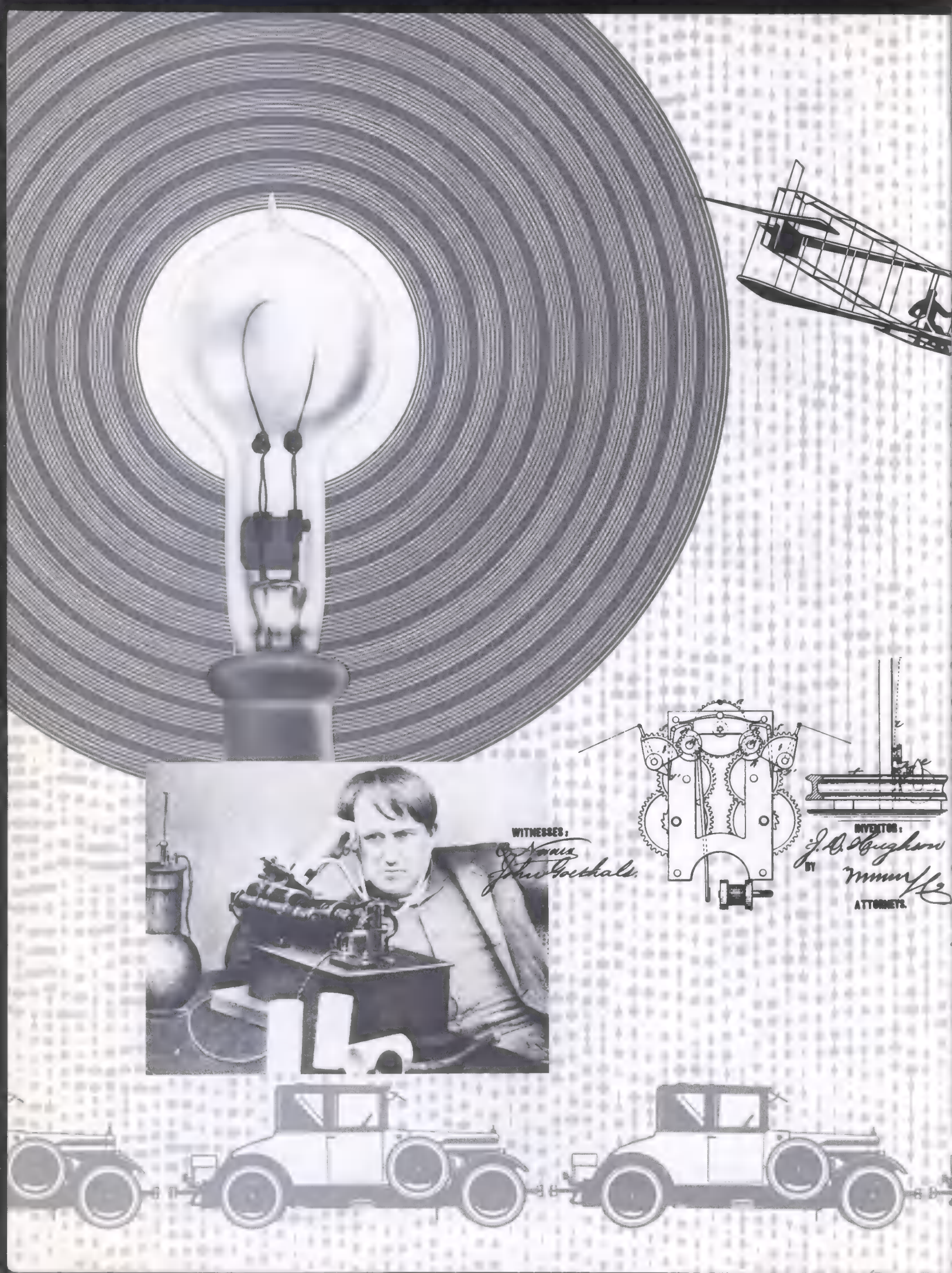
The idea was born when a small but enthusiastic group of businessmen acted on an idea proposed by Senator Jacob K. Javits (R.-N.Y.). The proposal: to make start-up capital and management skills more readily available in Central and South America.

"As might be expected—with Tom and Dick Watson being internationally minded advocates of risk-taking—IBM was one of the first four companies behind the new venture," recalls IBM Treasurer Bertram H. Witham, who has been a director of ADELA from its early days, and was elected a vice chairman at its recent tenth anniversary meeting.

The other three companies that agreed to back the new venture in late 1963 were First National City Bank, Ford Motor Company, and Standard Oil of New Jersey (Exxon). Backing by firms abroad quickly followed and, the following year, the new company was incorporated in Luxembourg.

Today, more than 235 companies from around the world are ADELA shareholders. And its measurable economic contributions in Latin America exceed $2.5-billion in direct and complementary investments.

From meat packing in Argentina to tuna fishing in Panama; from paper making in Brazil to book binding in Chile, ADELA has furnished an example of how private enterprise can generate new growth in developing nations. ■


WITNESSES:
INVENTOR:
BY
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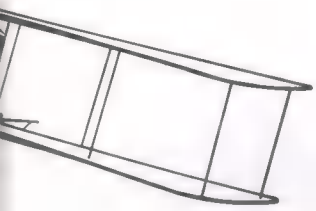
by Lee Edson



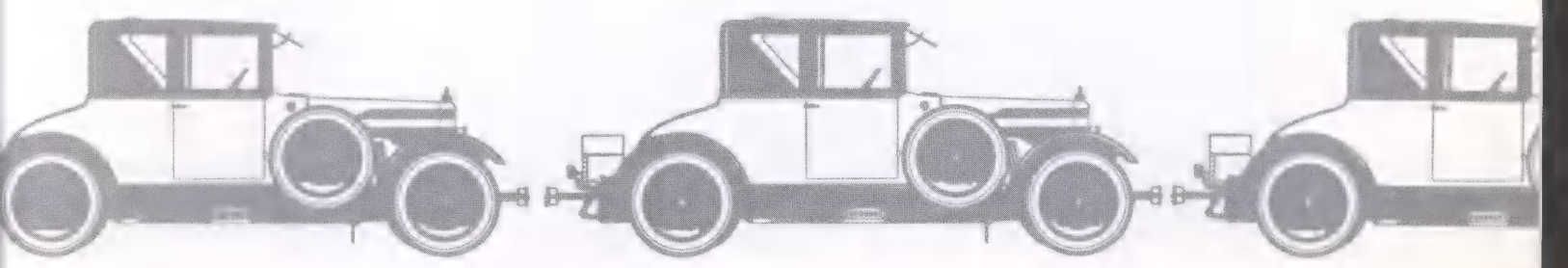
In the annals of modern invention, one of the more incredible stories to come to light in recent years is that of Bert Adams, a one-time welfare client who invented a battery that works on water instead of acid, saw it put into use by the U.S. Army, and, after spending the next 20 years battling for justice through the courts, finally won one of the nation's largest settlements for infringement of patent.

Adams, a man with little formal education but enormous persistence, seized upon the concept that ordinary batteries could be made cheaper, longer-lived, and more effective with a conducting fluid of ordinary water. The only trouble was that, as every high school youngster has known since the time of Volta (the great Italian physicist who invented the battery in the late 18th Century), water is a poor conductor of electricity. Undaunted by such venerable textbook knowledge, Adams experimented in his small flat in Brooklyn and finally devised a tiny battery made out of a can containing two special electrodes (of copper chloride and magnesium) with two wires attached. He bridged the wires with an electric light bulb. Then he poured water into the can; and amazingly the lamp lit up. Why it worked, Adams didn't know.

There's a lot more to it than just building a better mousetrap. The trick is to get it to market.

Adams patented the invention and then tried to sell it to business and government. Everywhere he went, representatives watched with fascination as Adams demonstrated his homemade battery. But nobody bought the idea. Some cynics thought he was faking, but couldn't figure out how; others simply weren't sure what to do with such a novel battery. Adams ultimately demonstrated his device to the Navy and the Army, both of

INVENTION

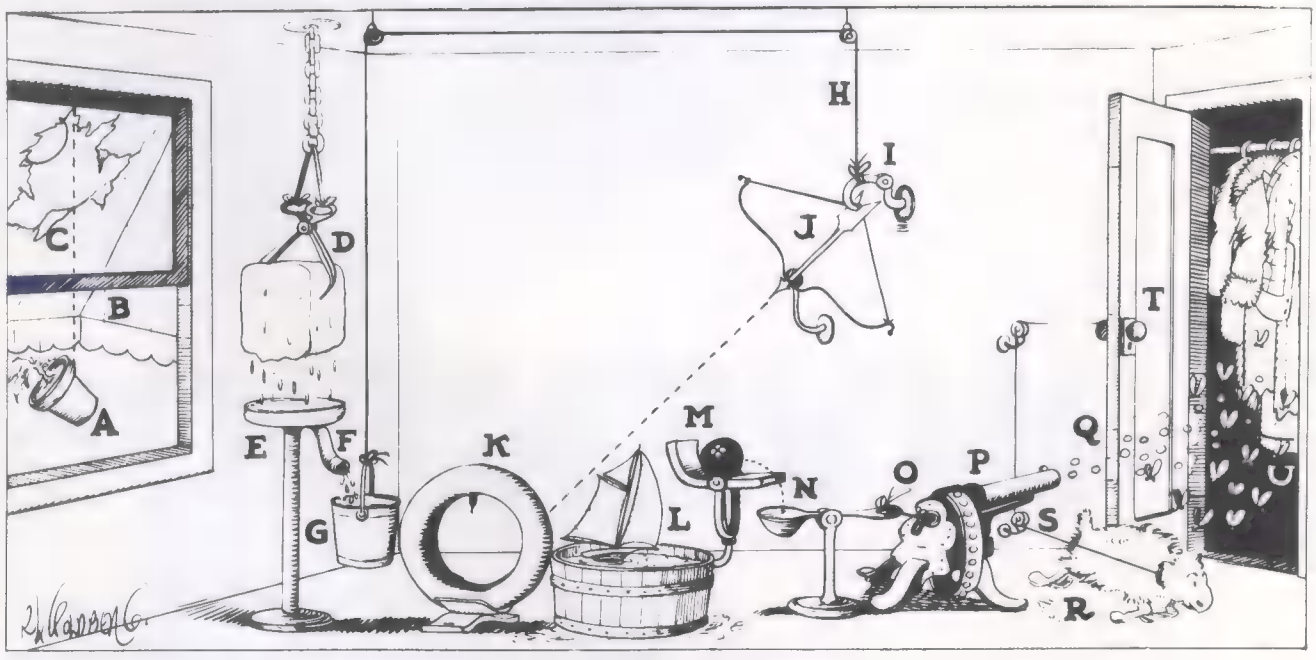


World's zaniest inventor

No story of invention is complete without reference to the father of noninvention—the late Pulitzer Prize-winning cartoonist, Rube Goldberg. His influence is so pervasive that Webster's *International Dictionary* defines ■ rube goldberg as a "method or contraption that accomplishes by roundabout means what could be done simply." Recently, the Smithsonian Institution held an exhibit of Goldberg's zany excursions into implausible invention.

Among other things, Goldberg invented a cartoon inventor named Prof. Lucifer Gorgonzola Butts, who for more than two decades twitted the developers and managers of our technological society by producing models of elaborate illogical inventions that have gone down into history as the guide to what invention should not be. A typical invention shows how to exterminate a moth in 20 easy steps *(see accompanying illustration)*.

In a similar manner, Goldberg (or Butts) has managed to invent many other gadgets obviously overlooked by big industrial firms (and little ones as well). These include an automatic screen door closer, a collar-button finder, a complex cork remover, a soap retriever, a self-operating napkin, and an automatic device for emptying ash trays. Any IBMer who wishes to play the Rube Goldberg game can easily develop his or her own zany invention: Just start with an owl, or a housefly and keep going until a completely impractical device results. ■



THE PROFESSOR EMERGES FROM THE GOOFY BOOTH WITH A DEVICE FOR THE EXTERMINATION OF MOTHS.

START SINGING. LADY UPSTAIRS, WHEN SUFFICIENTLY ANNOYED, THROWS FLOWER POT (A) THROUGH AWNING (B). HOLE (C) ALLOWS SUN TO COME THROUGH AND MELT CAKE OF ICE (D). WATER DRIPS INTO PAN (E) RUNNING THROUGH PIPE (F) INTO PAIL (G). WEIGHT OF PAIL CAUSES CORD (H) TO RELEASE HOOK (I) AND ALLOW ARROW (J) TO SHOOT INTO TIRE (K). ESCAPING AIR BLOWS AGAINST TOY SAILBOAT (L) DRIVING IT AGAINST LEVER (M) AND CAUSING BALL TO ROLL INTO SPOON (N) AND PULL STRING (O) WHICH SETS OFF MACHINE GUN (P) DISCHARGING CAMPHOR BALLS (Q). REPORT OF GUN FRIGHTENS LAMB (R) WHICH RUNS AND PULLS CORD (S), OPENING CLOSET DOOR (T). AS MOTHS (U) FLY OUT TO EAT WOOL FROM LAMB'S BACK THEY ARE KILLED BY THE BARRAGE OF MOTH BALLS.

IF ANY OF THE MOTHS ESCAPE AND THERE IS DANGER OF THEIR RETURNING, YOU CAN FOOL THEM BY MOVING.

From the book RUBE GOLDBERG: HIS LIFE AND WORK
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whom investigated it thoroughly and then abruptly forgot all about it. Or so Adams thought.

Years went by. Adams never lost his dream, but he gave up trying to sell the battery. Taken ill, he eventually went on relief. Then one day quite by accident a friend called his attention to a technical paper in a journal written by a prominent U.S. Army Signal Corps scientist and dealing with—of all things—a nonrechargeable battery that worked on water. It was being used, among other ways, in missile power units and sea rescue kits. Adams read the paper—and recognized his own idea.

He consulted an attorney, only to find that it would be too expensive and frustrating for him to conduct a lengthy suit against as formidable a foe as the U.S. Government. He was about to drop the idea of a suit when a wealthy businessman client of the attorney became intrigued and decided to stake Adams in the fight for his invention. In the U.S. Court of Claims (which hears cases of patent infringement by the Government), Adams won a resounding victory. The Army promptly appealed and carried the case all the way to the Supreme Court. Finally in 1966, Adams' long struggle came to an end as the nine justices watched him demonstrate once again how he could pour water into his unique homemade battery and cause a lamp to light up. The remarkable result: The Court, after listening to all the testimony, awarded Adams $2.5-million. Moreover, Associate Justice Tom Clark chastised the U.S. Government scientists for taking advantage of a dedicated inventor's "flash of genius."

The curious, little-known story poignantly points up the fact that the small independent inventor who pursues the old American dream despite all odds is still alive and active in the United States. "The pace of invention is as great as ever," says C. Marshall Dann, commissioner of patents and head of the Department of Commerce's most famous bureau, the U.S. Patent Office. "Even though the total number of patents is now dominated by inventors working for large organizations, nearly one-fourth of all patents—about 400 a week—still are granted to small independent inventors. In fact, we're even encouraging them to do something about energy, and they're responding with hundreds of new patentable ideas."

Independent inventors, who come from all walks of life and all parts of the world, are responsible for many of the major popular discoveries of our century. Leo Godowsky and Leopold Mannes (the brother of writer Marya Mannes) were music teachers and concert pianists who invented Kodachrome™ film between tours; Chester Carlson was a magazine publisher and a patent attorney who invented xerography, the key to the ordinary paper copying machine; King Gillette was a traveling salesman who thought of a cheap, disposable razor blade while shaving during one of his trips; a Hungarian sculptor named Ladislavo Brio invented the ball point pen. One of the most amazing inventors of our time is 72-year-old Sam Ruben of New Rochelle, N.Y., who, with relatively little formal education (though he now holds a Ph.D.), is personally responsible for a vast number of inventions that lie behind many products. Refrigerators would not start, washing machines and air conditioners would fall apart, and radio and TV would fail to provide their accustomed entertainment were it not for one of Ruben's "little" discoveries—the mercury battery.

In a study of the impact of invention, *Sources of Invention* (Norton, 1969), British analysts John Jewkes and David Sawers along with Richard Stillerman of Chicago point to the major advance in petroleum refining and processing—catalytic cracking—that came from the fertile mind of an independent French inventor named Ernest Houdry. They also point out that the basic ideas in aviation came from independent daredevil inventors from the Wright brothers on.

Not all independent inventions produce such worldshaking consequences, of course, but the independent inventor is still responsible for the range, depth, and flow of imaginative gadgetry which is expected to reach four million patents during the U.S. Bicentennial Year of 1976. Recently, the *Official Gazette*—the U.S. Government's compendium of the daily flow of dreams that are processed through the Patent Office—revealed such far-out joys of innovation as a high-pitched ultrasonic toothbrush (which you can presumably use to call your dog when you're not brushing your teeth); a hat that salutes by "elevation and rotation." There

Invention: What Is It?

Invention, discovery, and development are terms that are often confused. And understandably so, because the three words are sometimes used interchangeably. Generally speaking, however, invention is defined as the design or fabrication of something from old (or new) materials. It demonstrates—in the words of the patent laws—the creation of subject matter "non-obvious to those skilled in the relevant arts," in that the inventor, often flying in the face of the state of the art, comes up with a design that nobody ever thought of before. On the other hand, discovery is the finding of something that evidently has always been there. Newton's discovery of the law of gravity, for example, is the awareness that all objects, from apples to moons, attract one another in a certain way. As one author put it, America was discovered, but the United States was invented.

The use of the term development adds yet another dimension to the subject. In a restricted sense, development refers to converting a concept, through refinement and improvement, into a marketable product or process. Development can lead to an invention because the product that emerges may be completely new, and therefore patentable.

For example, the primal invention of the telephone has been refined and further *developed* over the years into a modern device of streamlined design, clearer tone, and push-button facility. That hasn't changed Alexander Graham Bell's primal invention, but his invention has been further developed, leading to still more inventions that have enhanced the telephone.

Patents

Some 230 professionals sift the possibilities and file the applications. Rewards for inventors total a half-million dollars a year.

The work of IBM patent operations is carried out by 230 patent professionals, many of whom hold degrees in both engineering and law. Located throughout the world, they report to John R. Shipman, director of patent operations, at Corporate Headquarters. One of their prime responsibilities is to review lab development work for patent possibilities and to assure that IBM products do not infringe on intellectual property rights of others, or on patents, trademarks, and copyrights in the many countries of the world where IBM does business.

Of the 5,500 or more disclosures (written descriptions of patent possibilities) submitted by IBM inventors each year, only about 10 percent, or 550, will be chosen for filing. A patent may be issued within two years, or it may take longer. Some 30 or 40 percent of the IBM disclosures not filed in a patent office are published, for protection, mainly in IBM's *Technical Disclosure Bulletin*. Once published, they usually cannot be patented by anyone else.

The company holds some 8,000 U.S. patents and about 33,000 worldwide, although the latter figure includes double counts for patents issued both here and in other countries on the same invention. To protect itself throughout the world, IBM files corresponding applications in major countries and, on a more selective basis, in small ones as well. It has begun to file a few patent applications in Russia. The cost of obtaining a typical IBM patent in the U.S. ranges from $5,000 to $7,000, including administrative and legal expenses.

Like other large companies, IBM owns its patents although the inventor's name, or names, appears on or in close association with it. The company rewards its inventors to the tune of well over half a million dollars annually. For each "invention plateau"—a total of 12 points; one point per publication and three per patent application—an inventor receives $1,600.

In addition to Corporate Invention Achievement Awards, there are Outstanding Invention Awards. Divisions recognize their own creativity with cash awards as high as $20,000, and there are no limitations on Corporate Awards under this program.

are devices to prevent grapefruits from squirting juice into your eye; humane mouse traps that tinkle bells to scare away the mice.

Inventors are almost as variegated as their ideas. A 12-year-old eighth-grader in Toledo named Becky Schroeder recently got a patent for a luminescent backing sheet for writing in the dark. Becky conceived the idea because she was frustrated in trying to do her homework in the back of a dimly lit car while waiting for her mother to return from shopping. At the other end of the age spectrum, John W. Caughey got a patent last March—on his 100th birthday—for a portable, "fall-proof" stepstool.

Many inventions come out of the prisons, the most recent being a teaching video robot designed for prisoners who want to improve themselves while serving time. Inventions from people in prison have ranged from a surgical table invented by a San Quentin inmate to the Carbine rifle invented by David M. (Carbine) Williams while serving a sentence in a North Carolina prison.

For two centuries, from the time of Benjamin Franklin's lightning rod to the marvels of modern electronics, invention has been as indigenous to the American way of life as baiting baseball umpires or eating hot dogs. In the 19th Century, which is often regarded as the age of the independent inventor, such men as Ford, Edison, (who got the highest number of patents ever—1,093 to be exact), Samuel Morse (of telegraph fame), and Joseph Henry took the center of the stage as heroes of American culture. The railroad network, the quantity production of steel, the automatic machine tools that brought mass production, the long-distance transmission of electric power, the telephone and radio, the airplane and low-cost auto—these are the industrial products of inventions that have helped make the United States the leading industrial power in the world. Invention has indeed been so much a way of life that one man in the public eye got patent No. 6469 "for buoying vessels over shoals," but unfortunately he never got to apply it because of other pressing matters. His name: Abe Lincoln.

After World War II and the development of the A-bomb —perhaps the most historic invention of a U.S. Government team—government and corporate teams came increasingly into ascendancy as the source of major invention. Some corporate inventions—notably the transistor which was developed by a three-man group from Bell Labs (Shockley, Bardeen, and Brattain) spawned a massive industry; others such as 3M's masking tape helped spur the growth of the corporations that sponsored them.

Whether as a garret independent, or as a staff member of a corporation (Irving Langmuir—high-vacuum tubes, and Charles Kettering—automobile self-starter, are great examples of inventors who were most creative while in the employ of large corporations), most inventors seem to have some similar personality traits. A composite profile—based on detailed studies of 171 inventors over a period of 300 years—shows remarkable uniformity in their makeup. They are energetic, intelligent, eccentric, generally timid and sensitive. They were inspired by the pleasures of contrivance and ingenious solutions to problems rather than by the desire to amass a fortune. Only a small percentage made a great deal of money from their inventions, and fame was even more elusive. How many, for instance, recall the name of Christopher L. Sholes? Yet it was he, along with Carlos Glidden and Samuel Soulé, who invented an instrument that is as familiar today as the incandescent lamp—namely, the typewriter.

The act of invention, like all creative enterprise, is still viewed even by the scientific community as one of the more mysterious impulses of the human mind. But the most spec-

tacular single characteristic of the practitioners is not only vision but persistence in achieving that vision. Bert Adams clung to his battery through desperate moments when a lesser man might have lost hope; Peter Goldmark so tenaciously wanted to develop a phonograph disk that would provide the uninterrupted musical flow of the symphony that he scrounged materials from scrap to continue his research on the LP even when management told him to drop it; Felix Wankel took some 25 years to perfect his rotary engine and see it adopted in an automobile.

The individual who fits the profile of the persistent inventor and is tormented with the irritation of an unforgettable idea still has a long way to go to convert his or her idea into a gadget or process or anything else that will fulfill its destiny.

The actual process of applying for a patent sounds easy but can be relatively complex. It involves a search of prior art to see if the idea is as original and novel as the inventor thought; and some highly specialized advice and assistance —legal and technical—in preparing a patent application.

Patent protection lasts for 17 years, during which time the owner has exclusive rights to the invention. The inventor may sell the patent outright or may retain ownership and license others to use the invention.

The average wait in the U.S. from application to patent is about 22 months, although the Patent Office recently announced it will rush the application to approval in six months flat if it is in the energy field. The average filing cost in the U.S. Patent Office is $235. Total costs run considerably higher, however, depending on legal fees and the complexity of the claims under the protection of the patent.

But the patent is only the beginning step for the inventor. The main problem is to *do* something with the patent—and the invention it represents. One expert, Rolf Darbo, who holds 10 patents and ran a patent clinic at the University of Wisconsin, says that invention is no longer 10 percent inspiration, 90 percent perspiration as Edison once thought. "It is," Darbo says, "now 1 percent inspiration, 9 percent perspiration, and 90 percent marketing and promotion."

Individuals who find it difficult to raise capital for promotion, or to sell the idea to a company can take comfort in the fact that corporations often find it tough, too. DuPont invested over $25-million in the development and marketing of Corfam, a substitute for leather, but it was beaten out by a rival product.

The average time and cost between invention and the application of that invention continues to vary spectacularly, with averages hard to figure. It took only $100,000 for Sir Frank Whittle to develop the turbojet engine and 10 years to see it in aircraft operation. On the other hand, it has taken Bell Labs $28-million and 20 years to develop the transistor to its present commercial utility. Dennis Gabor spent about $1,000 to develop the first hologram, but it took 25 years for holography to reach its potential commercial stage. Finally, despite the invention of a method to extract oil from shale some 35 years ago, the process is still bogged down in economic uncertainty.

Despite the long odds, and the record of disaster and frustration attendant on invention, inventors painstakingly continue to give birth to new ideas and attempt to nurse them into maturity. As an author once said, there is a bit of Edison in all of us. ■

Freelancer Lee Edson, a nationally known science writer, has written frequently for The New York Times Magazine *and* Think. *He collaborated with former* CBS *executive Peter C. Goldmark in the writing of the latter's book entitled* Maverick Inventor.

Clark, Dan, Richard, Bill, and Hobie Kurtz

100 years

The five Kurtz brothers celebrate their own centennial of IBM service. Like their father, they all started at Poughkeepsie.

This December, as the nation moves toward its bicentennial two years hence, the five Kurtz brothers are quietly celebrating a centennial of their own—their first hundred years with IBM. Like their father before them, each in turn—first Hobart, Jr., then Daniel, William, Clark, and Richard—crossed the Hudson River from the village of Highland, N.Y., 28, 22, 20, 19, and 11 years ago, respectively, to take a job with IBM in neighboring Poughkeepsie.

The brothers range in age from 48 (Danny) to 31 (Richard). Jokes Hobie, at 45 the second oldest and the recognized spokesman for the group: "If I had been a girl our parents would have stopped there. As it is, they got a basketball team."

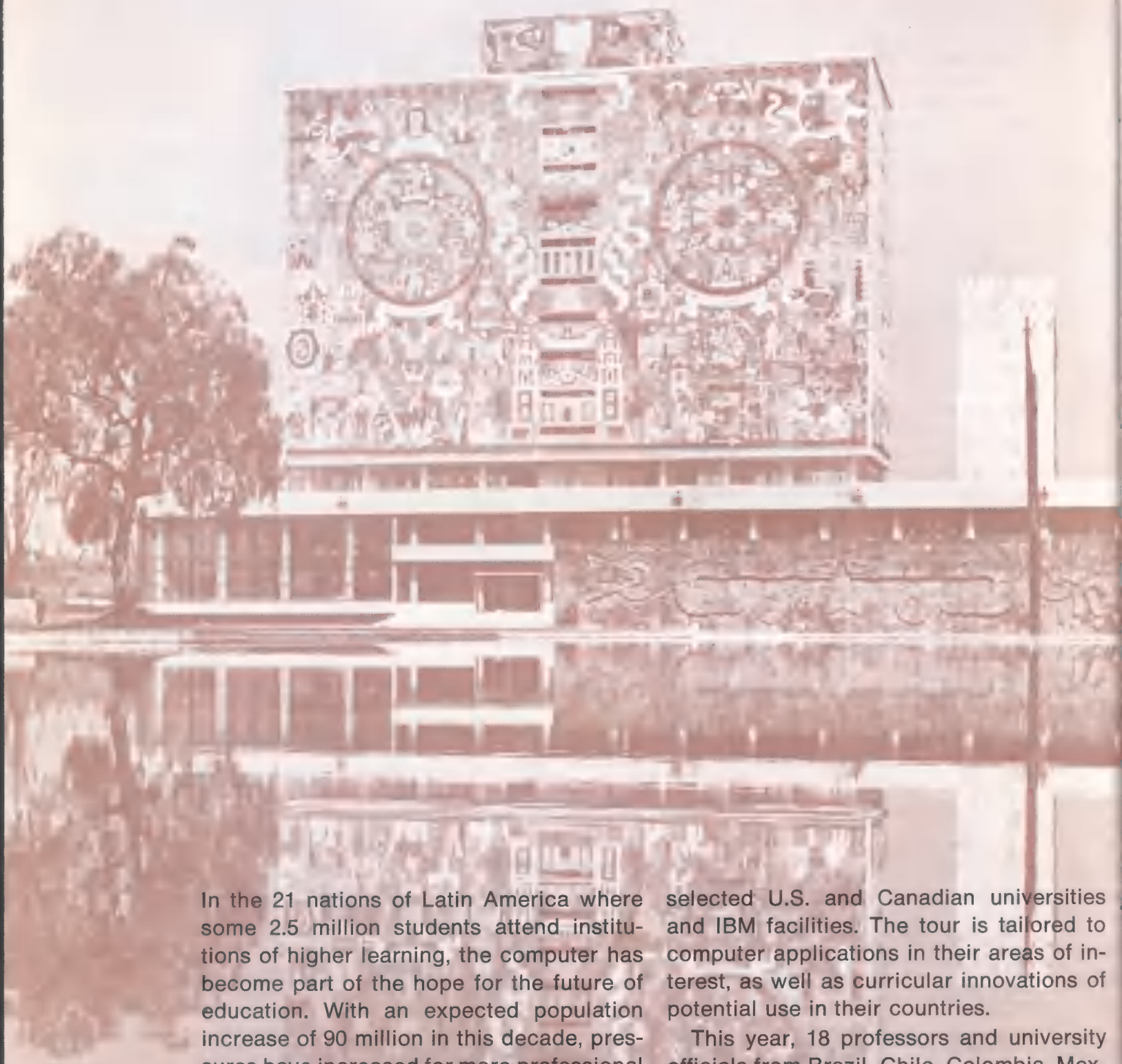
Gaps in their ages prevented that, but all shared their parents' interest in music. Hobart, Sr., who retired in 1966 from his job in plant maintenance, used to accompany the silent movies in the Highland theater with his violin, while his late wife, Irene, played the piano. At one time, four of the boys and their mother sang in the choir of the Methodist Church. All were members of the high school glee club and band, though not simultaneously. They also played on the baseball, football, and basketball teams. "You have to remember," says Hobie, "it was a very small school."

Among them, they total up 12 years of military service. Danny served on Okinawa during World War II. Hobie was in Korea with the U.S. Navy, Bill went to the Panama Canal Zone with the Air Force, and Richard spent three years in the Army, two of them in Japan.

At IBM, too, the brothers have gone their separate ways, although Hobie, an advisory engineer in System Development Division's advanced systems design, and Clark, recently made a manager in SDD advanced systems development, have twice worked in the same design group. Hobie holds an Outstanding Contribution Award and Clark has four patents to his credit. Richard, a product test engineer, is on loan to SPD development from SPD manufacturing. He's involved in microprogramming.

Danny commutes to his job at Sterling Forest, N.Y., where he tests application programs as a senior associate systems analyst for the System Products Division. Bill, who as a kid used to play hookey from school to go listen to the IBM brass band on the company's "pretty grounds" at noontime, is the only one to leave the area. He's a senior associate industrial engineer at SDD in Manassas, Va., where he does space planning. ■

Hands across the Americas

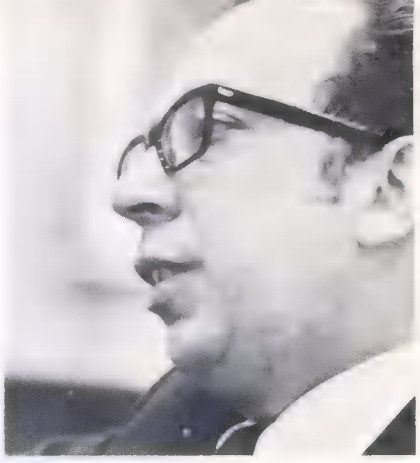


In the 21 nations of Latin America where some 2.5 million students attend institutions of higher learning, the computer has become part of the hope for the future of education. With an expected population increase of 90 million in this decade, pressures have increased for more professional graduates to help achieve greater industrialization and improved management.

Since 1967, IBM has sponsored seven Latin American university professors' tours, part of a broader program which brings faculty members from overseas universities to selected U.S. and Canadian universities and IBM facilities. The tour is tailored to computer applications in their areas of interest, as well as curricular innovations of potential use in their countries.

This year, 18 professors and university officials from Brazil, Chile, Colombia, Mexico, Peru, and Venezuela made the two-week tour which began at the A/FE education center in Cuernavaca, Mexico, and ended in Armonk.

In Armonk, *Think* talked to three of the professors.



by Howard K. Janis

Peru's population of 15 million is expected to double in the next 25 years. Educators there like Dr. Antonio Pinilla, founder and rector of the 12-year-old University of Lima, are already worried about the inability of that country's universities to keep up with the demand.

He believes that computers may help, and not only in their own business administration. Indeed, he foresees the possibility of what he calls "a new pedagogy"—using computer-assisted instruction and TV to reach greater numbers of students.

Educational problems in Peru are formidable. Some 40 percent of the population is still illiterate. In recent years, the government has been attacking this problem vigorously. This has been reflected in greater numbers of people attending primary and secondary schools. Now, says Dr. Pinilla, higher education for more students will make even better use of Peru's human resources.

Each year some 130,000 students from secondary schools present themselves for university entrance examinations. As yet, however, there is room for only 26,000 in Peru's 21 state and 12 private universities. "As a result," says Dr. Pinilla, who speaks with the urgency of a reformer, "we are creating frustrated people. We must stop slamming doors in their faces."

Expansion has already taken place. And Dr. Pinilla, who is also president of Peru's Association of Private Universities, remains hopeful. "If we can learn to use computers and possibly develop some teaching techniques of our own," he says, "they may help us to fulfill our goal of equal educational opportunities for all our people."

The National University of Mexico in Mexico City with its 170,000 students captures the vitality of that exciting capital city in the murals on its walls. Though the university is handsomely supported, its crowded conditions reflect the pressures among Latin America's young for higher education and the burdensome costs that come with them.

Professor Irene Estevão de Oliveira of Brazil is no stranger to the computer. She is vice rector of graduate education in the 22,000-student Federal University of Rio de Janeiro and executive secretary, Council of Coordination of Education and Research, at the renowned Getulio Vargas Foundation, where computers are used extensively in economic analysis for the Brazilian Government.

But the blonde educator, who speaks four languages, thought the professors' tour an eye-opener, especially in the use of computers in university administration and research.

Higher education in Brazil is booming, with a four-fold increase to 430,000 in enrollments for the decade ending in 1970. Then, only two years later, enrollments had more than doubled to 888,000 in that country's 66 universities and 636 other schools and institutes. Today, says Professor de Oliveira, Brazil has about 1.1 million students.

A vibrant, fast-developing nation, Brazil is the fifth largest country in the world, ranking after the Soviet Union, China, Canada, and the United States. Its population growth is startling; half the country's 100 million people are under 20 years of age.

Economic development and uneven regional growth are the central problems. As yet, almost half the work force is engaged in agriculture.

Nevertheless, with one of the fastest-expanding economies in the world, Brazil has become the leading Latin American manufacturer of vehicles, merchant ships, steel, and cement.

One of Brazil's signs of progress: Through IBM Brazil, it has become a major assembler of computers in Latin America.

Right now, says Professor de Oliveira, economics professors using computers are playing a significant role in furthering an orderly development. She adds: "It's impossible now to think of economic policy without the computer."

Mexico's population of over 50 million is exploding at one of the highest annual growth rates in the world, 3.5 percent. At this rate, it will double in the next 20 years. Mexico is struggling to enlarge its industrial base, strengthen its economy, and improve living standards. Meanwhile, its educational system is faced with an awesome need for expansion. Almost half the population is still in the middle teens.

Small surprise then that Professor Francisco Abel Treviño was excited by the possibilities he foresaw in computer-assisted instruction. An old hand at computers, he is director of the master's degree program in business administration at the Instituto Tecnológico y de Estudios Superiores de Monterrey, one of the most outstanding technical institutes in Mexico.

"I had never thought of the computer being used for instruction," he says, "but I saw it working on the community college level." While acknowledging cost and software difficulties, he foresees an ultimate role for computers in the instructional process.

"We need to provide better opportunities for more people to learn in all countries, in rural areas as well as in the downtown areas of cities," he says.

Even on the college level, he adds, well-done program packages might "provide a good opportunity for students to go over or reaffirm what they have covered in class."

In training the professional manpower necessary to Mexico's industrial development, a number of universities have installed computers and are teaching their use. Professor Treviño says that at his institute both graduates and undergraduates must take at least one semester of computer studies, including programming.

Professor Treviño says he's excited at the prospects of computers in academia, particularly in university-sponsored scientific research. For him, the IBM Latin American professor's tour was a "tremendous opening of new horizons." ■

Community Action

Recording for the Blind, Inc., has a large and continuing demand for recordings of computing and programming textbooks, which it provides to blind students. So the 19 volunteers from IBM's Chicago Distribution office, who read the text for recording purposes, are particularly welcome. Says Mrs. Paul Ware, director of Chicago's Recording for the Blind unit: "I contacted IBM for help, expecting just a small notice on the bulletin board. But they must have done more than that to get such a fine response. We're very grateful." Here, Carol Grossman, a systems engineering trainee, reads in a soundproof booth, while Dan Carlson, an industry specialist, follows the copy for accuracy.

"Computer salesmen uncrated celery, secretaries counted apples and oranges, and management types passed out turkeys at IBM this week as about 200 employees joined in 'Operation Turkey,' bagging company-bought groceries to be given to 1,000 needy families in the metropolitan area for Thanksgiving." That's how one Washington newspaper described the activity last year. Since 1971, Project Turkey has been a unique IBM activity in which volunteers package and deliver the holiday fixin's to families chosen by church and service groups.

Gayle Shaffer's favorite personal project is with Montgomery County General Hospital in Olney, Md., where one evening a week, he visits elderly patients. "It's not a big thing," he understates. "I just try to be a friend; give them some encouragement and make their hospital stay a little easier to cope with." Shaffer is also involved in Man-to-Man, a program in which volunteers on a one-on-one basis, regularly visit inmates of Washington's prison in Lorton, Va. The purpose is to develop a friendship, help the inmate find a job on release, and maintain a relationship that will help him become a better citizen.

The 26 families of Tobytown have a lot of catching up to do, and Joe Drayton, on social service leave from his job as an administrative analyst in asset and billing control at IBM Bethesda, is helping them do it. Until 1972, Tobytown was a community of shacks and neglect, a quirk of geography and history, in the midst of one of the richest areas of Montgomery County, Md. Then the County Housing Authority rebuilt the area to provide modern housing for the residents. Drayton's job is to help people

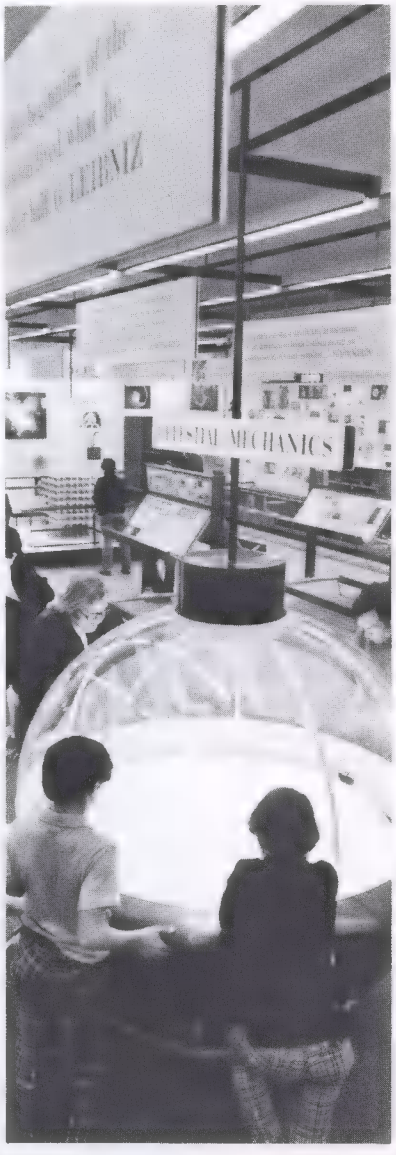
HEROES, Inc., may be unique to the Washington area. Established in 1964, the nonprofit organization honors the memory of law enforcement officers and fire-fighters who die in the line of duty. Even more important, it provides immediate and long-range financial assistance and professional counsel to keep the surviving family intact and functioning. IBM was represented among the charter members of the organization, which helps the families of 61 heroes from the District of Columbia and surrounding counties.

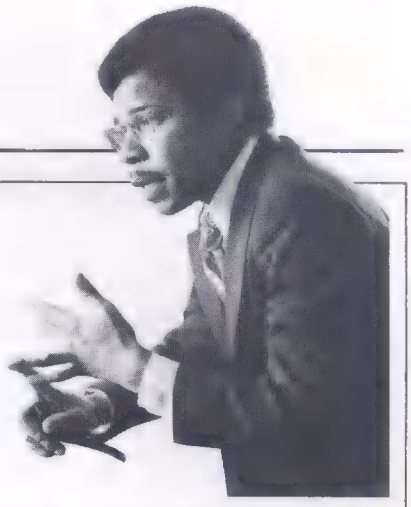
Here, two cities, Chicago and Washington, D.C., where IBM people are taking on volunteer projects to help the young, the aged, and the disadvantaged. Some projects are funded by company grants. Others out of IBM's Fund for Community Service. This easy-to-apply-for financial assistance out of the Fund for Community Service was already up to $700,000, company-wide, through October 31 for this year.

overcome a long history of social neglect and adjust to a new way of life. To do it, he gets involved in everything from organizing and providing directions to a homebuyers' association, to teaching basics of home maintenance and repair, to developing training and employment plans for many members of the community. At one point, Drayton made use of IBM's Fund for Community Service to get $500 for kitchen equipment to use in a nutrition class for Tobytown housewives.

Eighteen IBMers in the Sponsors for Educational Opportunity program have set up a reference area on colleges and college entrance information at the Data Processing Division library for Chicago high school students. It's being put to good use by Norm Chaykowski, manager of administrative support services, DPD, and Sheila Powell, 16, a high school senior. The two are planning her way to college to become a medical technician. "After awhile," says Chaykowski, "your student's goal becomes your goal, and you get a real personal satisfaction as you see a kid develop and reach something that might never have happened without your help."

Every year, since it was installed in 1961, more than 3 million people have visited IBM's "Mathematica" exhibit at the Chicago Museum of Science and Industry. The exhibit (there is a similar one in Los Angeles), designed by Charles Eames, consists of unique devices to demonstrate and explain many of the fundamental and intricate principles of math and physics. The company maintains the exhibit and also provides financial support for the world-renowned museum.





Bill Winston's expertise in business and marketing has been particularly important to Operation Impact, a last-resort program to reach and motivate youngsters with problems, who can't make it in the regular Chicago schools. Winston, a marketing rep in the General Systems Division, helped set up a popular "learn by doing" business course. Students actually run a retail business, which at various times has sold eggs, hosiery, groceries, shoes, and other items. As the students learn bookkeeping, salesmanship, and management, they also earn. When a student saves $100, he can open a charge account at Sears, another community-minded company, to learn about savings, credit, and interest. Winston's enthusiasm for the project is catching, and now Orselene Turner, a systems engineer, and Cliff Martin, a sales rep of Winston's office, are also involved.

One of the most successful youth projects in the Washington area is the Prep Club program. Its purpose is to help youngsters make the transition from high school to the world of work by teaching and advising them on such things as how to find a job, what to expect at a job interview, how to set goals and plan a career, and what career opportunities exist. IBM in Washington is sponsoring Prep Clubs in eight high schools in the metropolitan area with the volunteer services of some 25 IBMers. Al Thomas is an instructor in FE Education and coordinates activities in the D.C. schools. In teams, the volunteers conduct one class a week for 14 weeks in each of the schools.

What's new in engineering?

Lots. And to help engineers learn from one another's ideas, the System Products Division stages a symposium—its first.

The accent in engineering and development is plainly on professionalism. And nowhere more so than in IBM where an increasing number of engineers are specializing in a growing spectrum of disciplines and where graduate degrees in chemistry, physics, or mathematics have become almost as commonplace as undergraduate degrees were a scant generation or so ago.

Among the largest teams of IBM engineers in development, manufacturing, and design are those found in System Products Division labs and plants, where the distinctions among these separate categories are being blurred by the changing technology of computers. All told, close to 7,000 development people are at work in East Fishkill (the largest of IBM's facilities), Endicott, Poughkeepsie, Burlington, Kingston, Boeblingen in Germany, Essonnes in France, the manufacturing research laboratory at the Thomas J. Watson Research Center, and at Sterling Forest. The number includes nearly 5,000 professional engineers and scientists.

Traditionally, it has been the lot of engineers in industry to remain largely anonymous in much of the work they do because, more often than not, they are engaged in highly proprietary undertakings. Their reputations for creative work seldom go beyond their own circle of fellow employees.

That was somewhat true of engineers in the System Products Division—until last month. The change came when Division President Ted Papes went a long way in righting the imbalance with a division-wide symposium for outstanding engineers. More than 550 of them attended the IBM-confidential closed meeting in Puerto Rico, including almost 50 of the division's approximately 1,000 development programmers.

Each of the three day's general sessions had a different host, responsible for the day's program. Don Gavis, vice president of the development staff, welcomed the attendees and hosted the first day, followed by Dr. Ed Davis, division director of development, Endicott/Burlington/Boeblingen, and Dr. Paul Low, division director of development, Mid-Hudson Valley.

It was the first such interdisciplinary engineering meeting within the company since the more simplistic days of 20 years ago when mechanical and electrical engineering all but covered the spectrum, and disciplines were more easily defined.

As Papes put it, the symposium offered SPD engineers the opportunity "to show their wares" at a time when each succeeding advance in semiconductor technology is opening up new paths of ever more complexity while simultaneously blurring the definitions between disciplines.

The beginning of an annual event like the Hundred Percent Clubs of the marketing divisions? "No," says Papes. "We can't expect to have big meetings like this on a regular basis, nor would we want to institutionalize them. But

(Continued on page 48)

Coffee mill. Breaks between sessions offered the SPD engineers a chance to stretch their legs, exchange ideas, and make face-to-face contact with telephone acquaintances.

Biggest division

The System Products Division is the company's largest, employing almost 32,000 IBM people, most of them in the U.S. and a few in Germany and France. It has worldwide development and U.S. manufacturing responsibility for IBM's central processor products, including main storage and advanced logic technologies, packaging, channels and cables, power systems, and other features associated with the CPU. In all, the division makes 2,000 models of 500 machine types.

Nearly every IBM product division uses SPD know-how. For example, it makes printers for the General Products Division, controllers (combinations of logic, memory, and microcode) for System Development Division terminals, "intelligence" units for Office Products Division typewriters, and a variety of functional products.

In its continuing trend toward automating its own operations, the division now uses more data processing equipment in its own work than any IBM commercial customer.

SPD is one of three divisions in the DP Product Group, headed by Senior Vice President and Group Executive Paul J. Rizzo, which also includes the System Development Division and the General Products Division.

Under the leadership of Ted Papes, who became president of SPD when it was formed in September 1972, the division has completed two record-breaking production years. "This division," says Papes, "handles such a wide diversity of activity—from reconditioning small products to the most advanced development in the company—that one man can't cover it all. So you take the very best person in each of these disciplines—in manufacturing, development, planning, product management, finance, information systems, personnel—and put the job in that person's hands. You organize so the work can get done efficiently, set a framework for decisions, and establish agreement on objectives. You try to put in a management system that will let people know whom to deal with, and then let them manage their functions. And you pay attention to policy direction and strategic issues."

Mind stretcher. Conference members rewarded speakers with a high level of attention. Here, Judy Bradley, a programmer from East Fishkill, contemplates a point.

Counterpoint. During panel discussions, engineers were encouraged to speak out on controversial issues. At this particular forum IBM *Fellow Robert Henle offers his ideas on array logic.*

Pathfinders

Two winners of SPD's premier engineering award

Fred Buckley, top, and Dr. Wally Kleinfelder are the first two recipients of SPD*'s new Pathfinder Award for sustained technical excellence. Another 15 engineers received a total of five Outstanding Contribution Awards and one Outstanding Invention Award, plus cash prizes totaling $82,500.*

After 11 years with IBM, Pathfinder Award-winner Fred Buckley is, as he decribes it, "still almost in the same spot, doing pretty much the same thing."

All of which pleases Buckley very much. The spot, the machine technology area at the Endicott lab, is exactly where he wants to be; the "same thing" is circuit designing. And, says Buckley, "I never intended to be anything but a circuit designer. I'm in the enviable position of really enjoying my work."

Not that there's been anything static about Buckley's career or professional accomplishments. He has progressed steadily from his start as a junior engineer to the advisory engineer position he holds today. His technical achievements are spelled out in the record—six issued patents, another filed, 10 published disclosures, four "opens" (pending disclosures), a second-level Invention Achievement Award, and an Outstanding Contribution Award. All of which led to recognition as a "Pathfinder" at the recent System Products Division meeting.

Although the new SPD award is given for sustained technical contributions rather than for any one accomplishment, Buckley's citation dwelt on his special effort and perseverance in moving the concept of the "analog master slice" and for devising a computer program to minimize the time in producing "master slice chip personalizations."

In layman's terms a master slice is the basic background material for microminiature electronic circuits, which by the thousands are used in computer equipment. "Personalization" is the process of adding to and modifying the master slice to produce a circuit with precise characteristics for a specific application. The 32-year-old engineer came to IBM right out of the University of Pittsburgh with a B.S. in electrical engineering. In 1970, he received a master's in electrical engineering after participating for seven years in the IBM-Syracuse University program for on-location study.

Buckley, who makes circuit-designing sound like a rare and particularly pleasurable recreation reserved for just a few lucky people, admits to sometimes carrying his job home. On those occasions Mrs. Buckley—Effie Mae—often attends a nursing association meeting after two-year-old son, Colin, is asleep, while Buckley works on his latest "hot" project. Effie Mae, the daughter of a veteran IBMer (Charles Hamm, who incidentally, works in the same building as Buckley), understands his interest and enthusiasm for the job.

Spare time activities? "I guess you could say I'm a motorcycle freak,"

comes the reply. "In fact, I'm going to use some of the award money to buy a third bike."

Of the award, Buckley reports that it came as "an incredible surprise." He was seated with a group of friends from Endicott and, he says, "when I won, we were all very pleased that our work at the Endicott lab had been recognized."

* * *

"Large Scale Integration has one important aspect," Dr. Wally Kleinfelder commented. "It's not any *one* person's problem but affects nearly everyone."

The statement was made in an interview two years ago outside of Classroom D of Poughkeepsie's 701 Building where Dr. Kleinfelder, an ebullient engineer who wears his considerable store of learning lightly, was spearheading the development of the "Impact of LSI" a new course intended to introduce the concepts of LSI to a broad spectrum of IBM professionals and managers.

Last month, Dr. Kleinfelder, a manager of SPD's device and packaging laboratory in Poughkeepsie, received a Pathfinder Award for a 15-part, videotape version of the same course. In less than a year, it has served as a popular primer on LSI in faraway IBM laboratories in Belgium, the United Kingdom, and Sweden, as well as 25 major plant/lab locations throughout the U.S.

And the 35-year-old engineer put together the traveling production almost singlehandedly—in addition to his regular duties.

Since he first joined IBM in 1959 as a summer co-op student while completing a bachelor's degree in engineering at Rensselaer Polytechnic Institute, Dr. Kleinfelder has kept one foot in the world of education. He polished off a master's degree from Syracuse by working evenings and went on to complete a doctorate in engineering at Stanford under an IBM Fellowship program.

Along the way, he became a second-level Invention Award achiever, for a number of important advances, mainly in the field of semiconductor technology. (A second-level achiever must earn at least 24 points under IBM's Invention Award Program. Three are issued for each patent or patent application, one for each invention published.)

When asked to attend the SPD Engineering Symposium, Dr. Kleinfelder at first replied that he was too busy to make it. The reason: He was finishing up five additional segments of his videotaped LSI course. ■

Highlights

Excerpts from headliners at the SPD Engineering Symposium

It is the technology process that makes our business go. We are a young business, developing new technologies and solving more and more business, technical, and social problems. These technologies are increasing productivity for our customers. An inflation-ridden economy needs what we make.

—John R. Opel, IBM *president*

Whatever bold steps we take, they must result in sales. Obvious? Perhaps. But some technology organizations don't have to sell at all . . . You are in the midst of fantastically impressive, complex, technological efforts. You are on the forefront of those efforts. And I think you know that the laws of economics . . . certainly apply to IBM. Our great projects ultimately need to be bought by customers. It's our customers who'll tell us if we made it to the moon or not."

—Paul J. Rizzo, IBM *senior vice president and group executive*

Day in and day out, most of us are besieged with problems. Technical barriers, surprises, risks, new demands, schedules, cost escalations, potential show-stoppers. And if that's all you hear—problems—a person could get the mistaken notion that there is nothing but problems. And, of course, that would be wrong . . . In my experience, when things are noncontroversial, beautifully coordinated and all the rest, there isn't much going on.

—Theodore C. Papes, Jr., IBM *vice president and president of* SPD

As we press product development ever closer to the scientific state of the art, we must be sure that the base of technical understanding is adequate to limit technical risk to reasonable levels. It is right to not study things to death, and it is right to not get caught in sidetracks. The key is technical judgment, which tells you how much you have to understand and how much work needs to be done in order to have a chance of pulling it off.

—Dr. Lewis M. Branscomb, IBM *vice president and chief scientist*

A laboratory is much more than a place where we design machines to fill a known market requirement. It's a place where we invent what the market will need before the market itself knows it . . . A laboratory is a place where we learn, where we try, where we experiment, where we dare, where we invent, where we design, where we build . . . It's a place where we are stimulated by other professionals in our own discipline . . . a place that allows and should encourage unorthodoxy.

—Jerrier A. Haddad, IBM *vice president, engineering, programming and technology*

Ted Papes, IBM vice president and president of SPD

(Continued from page 44)

occasionally we need this kind of an information and idea exchange. We're going to have to learn from one another to move this business ahead."

Over 200 papers were proposed to SPD management by SPD engineers for presentation at the symposium. About 132 abstracts were then reviewed by a committee that included the division's nine IBM Fellows, a committee headed by Dr. William Lang, manager of the SPD acoustics laboratory, Poughkeepsie, who served as technical program chairman.

"Those papers were all good," says IBM Fellow Dr. David DeWitt. "As many as 100 of them were good enough for presentation. We had an awfully tough job in narrowing them down to 60, which was all we could accommodate in the seminar sessions."

A judgment on the quality of the IBM-only papers came from Jerrier A. Haddad, IBM vice president, engineering, programming and technology, and an old hand at professional meetings throughout the world. "No professional society," he told his audience, "could have put together a better program."

The papers were presented in parallel sessions throughout the three-day symposium. Most dealt with recent work, some of it controversial in the leading edge technologies that occupy the division. They covered a wide range—silicon, memory, computer graphics, chip design, arrays, large scale integration, testing, simulation, bubble dynamics, advanced systems packaging, heat transfer, automatic fingerprint coding, microprogramming, channel distribution, arithmetic logic units, to name but a few.

Moderators at the separate seminars included IBM Fellows Joseph C. Logue, Robert A. Henle, Dr. Otto G. Folberth, and Dr. DeWitt. IBM Fellows William F. Beausoleil, William E. Harding, Drs. Harold Fleisher and Jacob Riseman were also on hand to help out. Many of the forums provoked lively discussion and debate as proponents and opponents took to the floor to present their views. Among the topics: "Distributed vs. Centralized Computer Facilities," "Engineering Design Systems: Procedural Maze or Essential Tool?," "How Far Can LSI Go?" and "Array Logic vs. Random Logic."

Additionally, there were forums and tutorials—intended to instruct with a broad brush—on packaging, advanced systems objectives and design, and power systems.

In talks throughout the three days, IBM executives emphasized that engineers, though creatures of inspiration, must keep their feet firmly on the ground. In reality, Dr. Ralph Gomory, IBM vice president and director of research, told the group, invention is rarely the single illumination of one person, but the accumulation of many individual contributions.

As Jerry Haddad put it, the hallmark of a successful engineering organization is, first and foremost, achieving and maintaining a profitable and competitive product line. "Existence in our industrial world demands no less."

Said Papes on the final morning of the meeting: "We're putting a lot of money and a lot of talent where our confidence is. We have confidence that there is developing a spirit of joint commitment. In the days ahead, there are going to be frustrations, problems, new decisions to be made. When the going gets especially rough, I'd ask you to remember the depth of the team you're on." ■

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What are some of the new charges which the Government has sought to bring against IBM by amending its original complaint?

One is that IBM used pricing and marketing practices for its peripheral equipment with the purpose of restraining competition from entering the field.

The Justice Department also said in its Notice of Motion to Amend the Complaint that IBM has "monopolized interstate trade and commerce in tape drives . . . disk drives . . . add-on memory devices . . . for the purpose or with the effect of restraining or attempting to restrain its competitors from entering, remaining or expanding in the market for general purpose electronic digital computer systems . . ."

What follows are excerpts from Barr's remarks in court.

"

There is a fundamental issue here—and the Court knows it as well as I do—of notice and fairness. This Court has said several times that IBM is entitled, has a right, a duty to a vigorous, well-prepared defense. We have that obligation to ourselves and we have that obligation to this Court. We cannot make that kind of defense if we are going to go through the most elaborate discovery procedures in any Federal court with one set of issues, and get to the end of that line and have the plaintiff turn around and say, "Well, contrary to what I have said in the past, I would like to try some other issues."

* * *

Let me put the technical arguments aside, and deal directly with the question of whether permitting the plaintiff to make any substantial additions to the complaint at this late date, in whatever form, should be permitted.

I want to make four points, and they run together somewhat.

1 The first point is that the filing of these new charges will substantially delay the start of the trial and the final disposition of this case. How long depends on a number of things. It depends in major part upon the diligence of the parties.

* * *

2 My second point is that the delay does IBM harm and harms the public. I am speaking, Your Honor, not only of delay in getting the case started, but . . . a further delay because the trial will take longer.

* * *

So it is not only that we delay the start of the trial, but we inevitably increase the length of the trial, the number of witnesses. We inevitably increase the length of time which this Court has to spend in digesting the mountains of evidence and testimony. We inevitably extend the amount of time that the Supreme Court, if it is asked to review this case, will have to take in digesting and reviewing the evidence and this Court's opinion on all of the many different issues.

We may well be talking about adding two years to the final disposition of this case.

* * *

. . . in all that period of time, Your Honor . . . there is substantial harm to IBM and substantial harm to the public, both of whom are represented here, in not having the issues decided.

3 My third point is: I think there is no harm in denying the motion, no harm to the public interest. And that is true, I think, for two reasons. The first is because all of the charges that are sought to be added . . . are at bottom that IBM brought out better products at lower prices . . . One of the statements in the statement of the issues, the last statement, baldly states: "IBM developed and marketed and improved monolithic memory." That is all it says. That is an antitrust violation? I submit the Court and counsel know perfectly well it is not. But the charge here is better

memories, better tape drives, better disk drives, better terminals. And the prices charged the consumer were less.

There is no group of consumers sitting out there somewhere allegedly being overcharged or victimized in some way. Those people are on our side. They are on our witness list.

One of the curiosities of the plaintiff's witness list is that in a suit which, in theory, is brought to protect the public and protect the consumers, the plaintiff cannot come up with a single consumer to testify in its behalf. And we [IBM] have more than a hundred on our list, and we will submit to the Court more than a hundred depositions taken of Government agencies as consumers, who testify on our side. And if these issues are added we will bring many more, both private consumers and consumers from the Federal Government, who will testify to the same thing.

I once said in this Court that this case was a classic confrontation of different antitrust theories. The theory that I stand for and will stand for . . . is . . . protection of the consumer, the consumer's right to better products, and the consumer's right to lower prices. What the plaintiff stands for here is protection of individual competitors from competition. That is the classic confrontation that will be presented to this Court throughout the whole case.

But the only people who are unhappy with our better products and lower prices are a group of what I would describe as ne'er-do-well competitors, and they are almost all suing us already, and they are actively pursuing those lawsuits.

The Telex case, the Greyhound case are both in courts of appeals. One way or the other, the losing parties in both of those cases will try to go to the Supreme Court. There are seven more cases brought by this group of competitors before Judge McNichols, consolidated by the Multidistrict Panel before Judge McNichols of the Northern District of California. There is another case brought in Boston which may or may not be on its way to consolidation. Judge McNichols has stated that some of those cases at least will go to trial in September of next year. I say, Your Honor, that there is no reason to add the Department of Justice's muscle to those lawsuits. If those plaintiffs are correct—and we very strongly believe that they are not—but if they are, they will prevail in those cases. The prices of this equipment will go up because that is the relief they want. If they will prevail, those issues will be resolved, their interests will be protected. In my view, the public will be harmed, but their [the plaintiffs'] interests will be protected.

There is no need in those circumstances to clutter up this case with those claims in order to do justice, or in order to protect the public interest.

4 Fourth and finally, if the [Justice] Department really believes, really feels strongly about these new issues, it can file a separate lawsuit. There is nothing to prevent that. I think if they found that they could not use the new issues here to try to bail out the old case, they would conclude that they would not file a new case.

It is not unusual. It has often been my own personal experience that the Justice Department decides when private litigation is actively being pursued that that is not the time to allocate the resources of the Department of Justice. That, I think, is the conclusion that would be reached here because, I think, aside from a bail-out of the case they originally brought, these issues have no significance to them. They [the Justice Department] recognize, or should, as well as I, that they are brought only for the protection of a group of competitors who have other kinds of problems; that they are not truly seeking to protect the public or the consumer in filing those issues.

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